Technology Grade 5

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Online:
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C O N N E X I O N S

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1.1.5 SYSTEMS

PRIOR KNOWLEDGE

A. WHAT IS A SYSTEM?

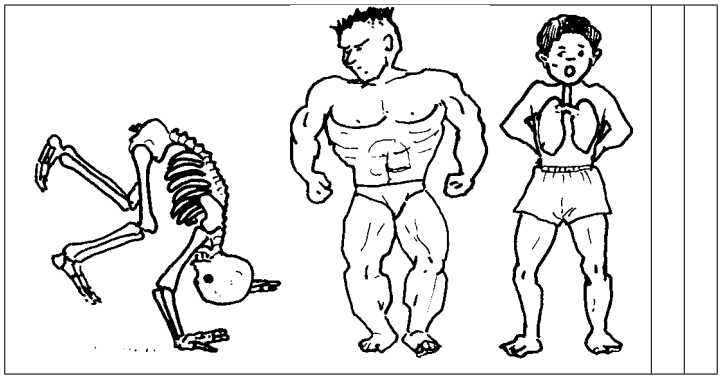
1. Gosh! Have you ever heard this word?

If your answer was *yes*, explain it briefly in writing. If your answer was *no*, have a careful look at the following:

Do you know that your body consists of nine different systems? Three of them are the **skeleton**, the **muscle system** and the **respiratory system**.

Assignment

1. Now write down the name of each system to correspond with the right picture below.



[1] This content is available online at <http://cnx.org/content/m23381/1.1/>.

Table 1.1

1. Can you name any of the other systems in your body?

A **system** is therefore a set of units that work together to perform a certain task.

Example: your skeleton consists of your skull (a unit) and all the other bones in your body (also a unit) that form a strong framework (task) for your body.

A. SYSTEMS IN TECHNOLOGY

In technology we find four systems, namely the **electrical**, **mechanical**, **hydraulic** (fluid pressure) and **pneumatic** (air pressure) systems.

A. MECHANICAL SYSTEMS

In this module we look at mechanical systems. An example of a big mechanical system is a bicycle. A mechanical system uses energy to carry out a specific function. This can be to change the speed, the direction or the force applied.

Assignment

Study the illustration with labels and answer the questions that follow:

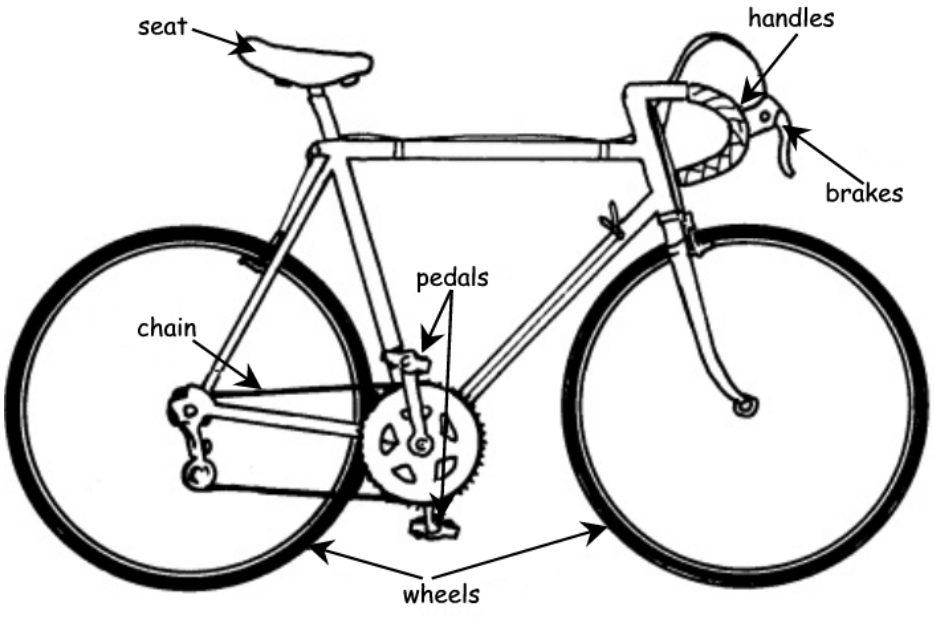


Figure 1.1

1. What part/parts of the bicycle forms/form the following? (Copy the table on a sheet of paper or in your workbook and then fill in the open spaces.)

	Part / Parts	Function
a) propulsion unit?		
b) steering unit?		
c) stopping unit?		

Table 1.2

1. What is the **function** of each of the above?

[LO 1.2]

If we "break up" the bicycle into different parts according to the task that each one carries out, it is easier to understand how each unit works. Each unit can also be broken up into smaller systems, namely an **input**, a **processing** and an **output** unit.

A. CONTROL

Assignment

1. What does it mean to exercise control? (Use the explanatory dictionary.)

Control can be exercised by means of an **open** or a **closed** system. An open system can be controlled, while a closed system works automatically. (You will learn more about this in the higher grades.)

A. TYPES OF MECHANICAL SYSTEMS OR MECHANISMS

Examples of mechanical systems are depicted in the pictures below, and next to each is the name of the type of mechanical system.

A. TYPES OF MOVEMENT THAT A MECHANISM CAN PERFORM

There are mainly four types of movement that a mechanical system can perform if a force is applied to it:
a linear movement (in a straight line and in one direction).
a to-and-fro movement (forwards and backwards in a straight line).
a rotating movement (movement in a circle, like a wheel turning).
a swing movement (a forwards and backwards movement in an arch like a swing).
Assignment

1. Draw an arrow in the first column of the table to indicate the type of movement each of the mechanical systems carries out.

A machine is a combination of different mechanisms/mechanical systems.
[LO 1.3]

A. MOVEMENT

The earth's gravitation causes all objects to be attracted to the earth. However, people have designed mechanical systems to allow machines to move in different directions and at different speeds. Wheels, levers, pulleys and gears make it easier to make a heavy object move.

1.1.6 Assessment

LO 1

TECHNOLOGICAL PROCESSES AND SKILLS

The learner will be able to apply technological processes and skills ethically and responsibly, using appropriate information and communication technologies.

We know this when the learner:

Investigates:

1.2 finds out about existing products relevant to a problem, need or opportunity, and identifies some design aspects (e.g. who it is for, what it looks like, what it is for, what it is made of);

- performs, where appropriate, scientific investigations about concepts relevant to a problem, need or opportunity using science process skills:

1.3.1 planning investigations;

- conducting investigations;

1.3.3 processing and interpreting data;

1.3.4 evaluating and communicating findings.

Makes:

1.7 outlines a plan that shows the steps for making, including drawings or sketches of main parts;

1.8 uses suitable tools and materials to make products by measuring out, cutting or separating, shaping or forming, joining or combining, and finishing the chosen material;

Evaluates:

1.10 evaluates, with assistance, the product according to the design brief and given specifications and constraints (e.g. people, purpose, environment), and suggests improvements and modifications if necessary;

1.11 evaluates the plan of action followed and suggests improvements and modifications if necessary;

Communicates:

- produces labelled two-dimensional drawings enhanced with colour where appropriate.

LO 2

TECHNOLOGICAL KNOWLEDGE AND UNDERSTANDING

The learner will be able to understand and apply relevant technological knowledge ethically and responsibly.

We know this when the learner:

Systems and control:

- demonstrates knowledge and understanding of how to use energy sources to power mechanical systems in order to make a product move in some way.

1.1.7 Memorandum

(a)

1. Answers will vary
2. respiratory system skeletal system muscular system
3. nervous system digestive system glandular system

nervous system

e) electrical f) mechanical

(c) **PartsFunction**

1. a) pedals, chain; wheels motion

b) handles; voorwiel change of direction

c) brakes stop

(d)

1. Answers from dictionary of your choice.

1.2 Let's look at levers[2]

1.2.1 TECHNOLOGY

1.2.2 Grade 5

1.2.3 MACHINES MADE EASY

1.2.4 Module 2

1.2.5 LEVERS

1.2.5.1 LET'S LOOK AT LEVERS

One of the easiest ways to lift a heavy object is by using a lever.
Assignment

1. What is a lever?

A lever is a *beam* that rests on something or that is attached to something and it works on this *point of support* or fulcrum.

1. How does a lever work?

By applying a *force* a *heavy load* can be moved relatively easily.

1. We get three main types of levers, namely:

Type1: A lever where the fulcrum is between the load and the force, e.g. a balancing scale.
Type 2: A lever where the load is between the force and the fulcrum, e.g. a wheelbarrow.
Type 3:
A lever where the force is between the load and the fulcrum, e.g. a man who is fishing.

1. INVESTIGATION.

Do the following experiments on the type 1 lever in groups.

a) What materials do you need?

a long metal woodwork ruler;
a small block of wood / eraser / round container
a medium-sized coffee tin with a lid / a pill container
drawing pins / paper clips
Experiment 1

- Aim:

To determine how a lever works.

- Method:

Make a lever by placing the metal rule on the block of wood.
Place the block of wood under the 15 cm mark on the ruler.
Fill the tin halfway with sand.
Place the tin of sand on the 0 cm mark on the ruler.
Now press on the ruler at the 30 cm mark.
Fill the tin completely with sand.
Press on the ruler at the 30 cm mark again.
Lift the empty tin and note how heavy it is.

[2]This content is available online at <http://cnx.org/content/m23382/1.1/>.

- **Observation**:

Is the half filled container lifted?
Is the full container lifted?

- **Conclusion**:

Was it just as difficult as when you tried to lift the tin by yourself?
Assignment
Make a sketch with labels of experiment 1.
[LO 1.12]

a) Experiment 2

(i) **Aim**:

To determine what will happen if we move the fulcrum.

(i) **Method**:

A. Place the block of wood under the 20 cm mark on the ruler.

Place the half-filled container with drawing pins on the 0 cm mark on the ruler.
Now press on the ruler at the 30 cm mark.
OR

A. Place the block of wood under the 10 cm mark on the ruler.

Place the filled container with drawing pins on the 0 cm mark on the ruler.
Now press on the ruler at the 30 cm mark.

(i) **Observation**:

Choose the correct word in brackets:
It is easiest to lift the container with drawing pins when the fulcrum is (*closest to/furthest away from*) the container with drawing pins. The experiment that proves this is attempt 2 (X / Y).
In attempt 2 (X / Y) the distance that you have to press down is the shortest.

(i) **Conclusion**:

The further away the pressure is from the (pivot / fulcrum), the greater is the pushing force exercised on the container, therefore making it easier to lift.

(a) Experiment 3

(i) **Aim**:

To determine where to push on a lever to obtain the best result.
What materials do you need?
A ruler.
A pencil.
2c coins.

(i) **Method**:

Place the pencil under the ruler in the middle. Place a coin at the one end of the ruler.

Let the other coin fall from a height of 30 cm to hit the ruler in the middle between the fulcrum and the other end.

(i) **Observation**:

Complete the illustration by drawing your observation.

Repeat steps 1 and 2 of the method, but let the coins fall on the edge of the ruler.

- **Observation**: The coin shoots (higher/lower) if the coin falls on the edge.
- **Conclusion**: The further away the pressure from the fulcrum, the greater the pushing force.
- Self-assessment

How did my group do in the experiments?

Write down the names of the learners in the group.

Write "yes" or "know" next to numbers 1 to 8.

	My group followed the instructions.		
	My group worked as a team.		
	We enjoyed the experiments.		
	We did well.		
	We helped and supported one another if something was not clear.		
	I listened to the other group members.		
	We all did the same amount of work.		
	I enjoyed working with my group.		

Table 1.3

9. If your answer to 7 is *no*, answer the following questions:

a) Who did the most? Why?
b) Who did the least? Why?
c) Discuss your answers in your group. Have you learned anything from this assignment? If so, write down what you have learned.

[LO 1.3]

1.2.6 Assessment

LO 1

TECHNOLOGICAL PROCESSES AND SKILLS

The learner will be able to apply technological processes and skills ethically and responsibly, using appropriate information and communication technologies.

We know this when the learner:

Investigates:

1.2 finds out about existing products relevant to a problem, need or opportunity, and identifies some design aspects (e.g. who it is for, what it looks like, what it is for, what it is made of);

- performs, where appropriate, scientific investigations about concepts relevant to a problem, need or opportunity using science process skills:

1.3.1 planning investigations;

- conducting investigations;

1.3.3 processing and interpreting data;
1.3.4 evaluating and communicating findings.
Makes:
1.7 outlines a plan that shows the steps for making, including drawings or sketches of main parts;
1.8 uses suitable tools and materials to make products by measuring out, cutting or separating, shaping or forming, joining or combining, and finishing the chosen material;
Evaluates:
1.10 evaluates, with assistance, the product according to the design brief and given specifications and constraints (e.g. people, purpose, environment), and suggests improvements and modifications if necessary;
1.11 evaluates the plan of action followed and suggests improvements and modifications if necessary;
Communicates:

- produces labelled two-dimensional drawings enhanced with colour where appropriate.

LO 2
TECHNOLOGICAL KNOWLEDGE AND UNDERSTANDING
The learner will be able to understand and apply relevant technological knowledge ethically and responsibly.
We know this when the learner:
Systems and control:

- demonstrates knowledge and understanding of how to use energy sources to power mechanical systems in order to make a product move in some way.

1.3 Let's make a puppet[3]

1.3.1 TECHNOLOGY

1.3.2 Grade 5

1.3.3 MACHINES MADE EASY

1.3.4 Module 3

1.3.5 LET'S MAKE A PUPPET

A. APPLICATION
B. Try to open the lid of a tin of paint. Is it easier to use a short or a long screwdriver? Explain.
C. Where on a see-saw is the best place for a heavy person to balance a light person sitting at the other end? Why?
D. A person's arms and legs are also levers. Do you agree? Give reasons for your answer.

[LO 3.2]
B. RESEARCH.
Assignment

[3] This content is available online at <http://cnx.org/content/m23384/1.1/>.

1. Make a poster on an A4 sheet of paper with pictures and/or sketches of the different levers. Add the necessary captions (burden, load, pivot).
2. What sources did you consult? (Copy the table and make a cross in the appropriate square.)

Newspapers	*o*	Pamphlets	*o*
Magazines	*o*	Experts	*o*
Subject literature	*o*	Photos	*o*
Computer	*o*	Sports picture books	*o*

Table 1.4

[LO 1.3]

1.3.5.1 C. MANUFACTURING – PLANNING

Problem: Your teacher found this pattern (Appendix 1 on page 19) for a dancing clown in a magazine, but cannot find the instructions. He/she wants you to design your own clown. Can you help him/her?

1. What material will you use to make the pattern? (Copy the table and make a cross in the appropriate square.)

Cardboard	*o*	Clay	*o*
Fabric	*o*	Glass	*o*
Plastic	*o*	Wood	*o*
Metal	*o*	Thick paper	*o*

Table 1.5

Give reasons for your choices. Write out the sentences, completing each of them as follows:
I use this material because _ _ _

1. Which tools are you going to use to make the puppet? (Copy the table and make a cross in the appropriate square.)

Coloured pencils	*o*	Scissors	*o*	Paper punch	*o*
Paint	*o*	Glue (Pritt)	*o*	String	*o*
Pastels	*o*	Bostik	*o*	Fishing line	*o*
Koki's	*o*	Pencil	*o*	Wool	*o*
Charcoal	*o*	Tracing paper	*o*	Beads	*o*
Paper punch	*o*	Stapler	*o*	Staples	*o*
Paper clips	*o*	Split pins	*o*		

Table 1.6

Explain the use of each instrument. Copy and complete as follows:
I use _ _ to _ _
[LO 1.8]
You have two hours to complete this assignment. Set out your steps clearly, and indicate the time you require. Copy and complete the following table:

STEPS	TIME
1.	
2.	
3.	
4.	
5.	
6.	
Date for handing in:	120 min

Table 1.7

Now make your dancing clown.
[LO 1.7]

A. EVALUATION (Self-assessment)

Evaluate yourself. Be honest. Write Yes, Unsure or No next to the respective numbers after you have completed your dancing clown.

1. Did you know what to do?			
1. Did I complete the task without any help?			
1. Did I work thoroughly?			
1. Did I work in logical sequence?			

continued on next page

1. Did I work neatly?			
1. Did I use materials sparingly?			
1. Am I proud of my model?			
1. Did I enjoy making the model?			
1. Did I bring all my material and tools every time?			
1. Did I tidy up properly afterwards?			
1. Did I complete my model?			
1. Is my clown colourful, attractive and does it work properly?			

continued on next page

1. Did I learn something new?			

Table 1.8

COMPLETE THE FOLLOWING QUESTIONS

1. This assignment involved (levers/gears/wheels and axles). Copy the sentence and underline the correct answer.
2. Did you have any problems while making the clown, and if so, how did you solve them? Write down three.
3. Would you work in exactly the same way if you had to attempt such a project again? If your answer is *no*, explain.

[LO 1.11]

1. Ask at least five friends to write their comments (next to their names) on your model below.

[LO 1.10]

A. EXHIBITION

Assignment

Decide as a class which five learners' clowns are the best and show them to other classes and to the principal. Someone might want to buy them!

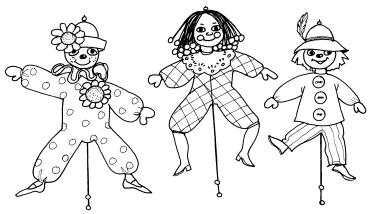


Figure 1.2

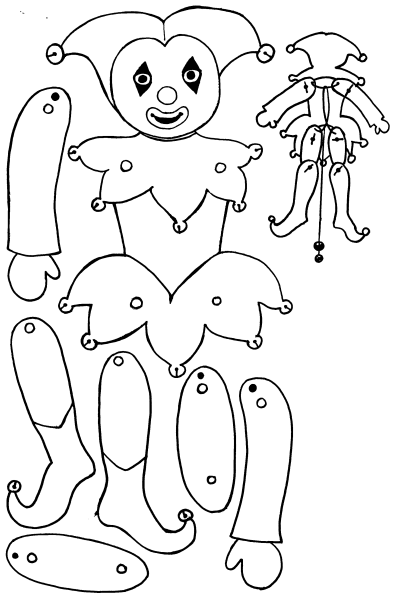


Figure 1.3

Appendix 1

1.3.6 Assessment

LO 1

TECHNOLOGICAL PROCESSES AND SKILLS

The learner will be able to apply technological processes and skills ethically and responsibly, using appropriate information and communication technologies.

We know this when the learner:

Investigates:

1.2 finds out about existing products relevant to a problem, need or opportunity, and identifies some design aspects (e.g. who it is for, what it looks like, what it is for, what it is made of);

- performs, where appropriate, scientific investigations about concepts relevant to a problem, need or opportunity using science process skills:

1.3.1 planning investigations;

- conducting investigations;

1.3.3 processing and interpreting data;

1.3.4 evaluating and communicating findings.

Makes:

1.7 outlines a plan that shows the steps for making, including drawings or sketches of main parts;

1.8 uses suitable tools and materials to make products by measuring out, cutting or separating, shaping or forming, joining or combining, and finishing the chosen material;

Evaluates:

1.10 evaluates, with assistance, the product according to the design brief and given specifications and constraints (e.g. people, purpose, environment), and suggests improvements and modifications if necessary;

1.11 evaluates the plan of action followed and suggests improvements and modifications if necessary;
Communicates:

- produces labelled two-dimensional drawings enhanced with colour where appropriate.

LO 2
TECHNOLOGICAL KNOWLEDGE AND UNDERSTANDING
The learner will be able to understand and apply relevant technological knowledge ethically and responsibly.
We know this when the learner:
Systems and control:

- demonstrates knowledge and understanding of how to use energy sources to power mechanical systems in order to make a product move in some way.

We know this when the learner:
3.1 recognises how products and technologies have been adapted from other times and cultures;
3.2 identifies possible positive and negative effects of scientific developments or technological products on the quality of people's lives and/or the health environment.

1.3.7 Memorandum

(A)
1. A longer screwdriver provides a more efficient lever. The longer the lever, the bigger the force applied on the load.
2. The heavier person should sit as close to the fulcrum as possible so that the load will not be too heavy.
3. Yes. Little children love to do "horse riding" on an adult's foot. The person's leg rotates round a fulcrum (knee, hip) and this creates enough force to control the load.

Chapter 2

Term 2

2.1 Measuring systems[1]

2.1.1 TECHNOLOGY

2.1.2 Grade 5

2.1.3 GRAPHIC COMMUNICATION

2.1.4 Module 4

2.1.5 MEASURING SYSTEMS

The development of measuring systems

Background:

Since the earliest times measuring was one of man's most important activities, but in those days no accurate measuring-instruments existed. Parts of the human body were used as measuring-instruments and these later became the measuring-units. As technology developed, and people gradually became more civilised, measuring-instruments and measuring-units became more accurate.

What is measuring:

Measuring is the process of comparing that which we want to measure with the unit with which we measure.

The Romans standardised and safeguarded the Babylonian measuring-systems in ± 600 B.C., and these systems were used throughout the entire civilised world of that time.

The Roman measuring system:

1 foot = 16 fingers' breadth = 12 inches

1 $\frac{1}{2}$ foot = 1 ell

2 $\frac{1}{2}$ foot = 1 step

5 foot = 1 double step

1 000 double steps = 1 mile

4 fingers' breadth = 1 hand breadth

3 hands' breadth = 1 span

2 span = 1 ell

ASSIGNMENT 1:

[lo 3.2]

What problem was caused by the fact that people of an earlier civilisation used their limbs as measuring-instruments?

[1] This content is available online at <http://cnx.org/content/m23419/1.1/>.

Measures and Weights

In Biblical times people used different measures and weights from those that are used today. Try to use their measures.

a) A finger's breadth is the breadth of a finger.

b) A hand's breadth is measured below the fingers.

c) A span is measured right across an outstretched hand.

d) An ell is the length from the elbow to the tips of the fingers.

ASSIGNMENT 2: [lo 3.1]

In old translations of the Bible we read that Goliath was six ell and a span. According to the scale one ell = two span, thus Goliath was _ _ span tall. Measure this out and then measure the length with a measuring-tape. How does his length compare with your own length?

(Copy and complete)

His length:

My length:

Difference:

According to the new translations of the Bible Goliath was

_ _ m tall (see 1 Sam. 17:4).

Is there a marked difference?

If there is, give a reason for this difference.

ASSIGNMENT 3:

[lo 3.2]

Something interesting: Noah's ark was 300 ell long.

Measure the ell (from the point of the middle finger to the elbow) of three teachers at your school. Copy the table and complete:

	Name of Teacher	ELL in mm
1		
2		
3		
	Average ELL	

Table 2.1

Calculate the length of the ark in mm

At break time, measure it out on your playing field. According to Gen. 6:15 the ark was 135 m long.

Does your answer agree with that?

If not, why would it differ?

Background:

In 1834 the English kings made it their mission to develop a uniform measuring-system that could be used throughout the whole world, because each country in Europe had its own system. The metric system came into being as a result of the work of brilliant French scientists and mathematicians who developed a new decimal measuring-system in 1795. A fixed length was allocated to a specific unit and this resulted in the fact that from then on measurements were reliable. By the end of the 19^{th} century 22 countries were already using the metric system.

Certain measuring-instruments were designed and this made the job of measuring things much easier. Some of these instruments are the tape-measure, the precision measuring wheel, the metre-stick and the ruler.

ASSIGNMENT 4:

[LO 1.2]

Explain briefly what each measuring-instrument is used for:

a. a tape-measure
b. a precision measuring wheel
c. a metre-stick
d. a ruler

2.1.6 Assessment

LO 1

Technological Processes and Skills

The learner will be able to apply technological processes and skills ethically and responsibly using appropriate information and communication technologies.

We know this when the learner:

1.1 finds out about the background context (e.g. people, environment, nature of the need) when given a problem, need or opportunity and lists the advantages and disadvantages that a technological solution might bring to people;

1.2 finds out about existing products relevant to a problem, need or opportunity, and identifies some design aspects (e.g. who it is for, what it looks like, what it is for, what it is made of);

1.3 performs, where appropriate, scientific investigations about concepts relevant to a problem, need or opportunity using science process skills:

- planning investigations;
- conducting investigations;
- processing and interpreting data;
- evaluating and communicating findings;

- writes or communicates, with assistance, a short and clear statement (design brief) related to a given problem, need or opportunity that demonstrates some understanding of the technological purposes of the solution;

1.5 suggests and records at least two alternative solutions to the problem, need or opportunity that link to the design brief and to given specifications and constraints (e.g. people, purpose, environment);

1.6 chooses one of these solutions, giving reasons for the choice, and develops the idea further;

1.7 outlines a plan that shows the steps for making, including drawing or sketches of main parts;

1.8 uses suitable tools and materials to make products by measuring, marking out, cutting or separating, shaping or forming, joining or combining, and finishing the chosen material;

1.9 works neatly and safely, ensuring minimum waste of material;

1.10 evaluates, with assistance, the product according to the design brief and given specifications and constraints (e.g. people, purpose, environment), and suggests improvements and modifications if necessary;

1.11 evaluates the plan of action followed and suggests improvements and modifications if necessary;

1.12 produces labelled two-dimensional drawings enhanced with colour where appropriate.

LO 2

Technological Knowlede and Understanding

The learner will be able to understand and apply relevant technological knowledge ethically and responsibly.

We know this when the learner:

2.3 demonstrates knowledge and understanding of how to use energy sources to power mechanical systems in order to make a product move in some way.

LO 3

Technology, Society and the Environment

The learner will be able to demonstrate an understanding of the interrelationships between science, technology, society and the environment.

We know this when the learner:

3.1 recognises how products and technologies have been adapted from other times and cultures;

3.2 identifies possible positive and negative effects of scientific developments or technological products on the quality of people's lives and/or the health environment.

2.1.7 Memorandum

1.

The lengths of limbs vary and therefore there were no consistent lengths. Dealers can therefore adversely affect each other on purpose.

2.

12 team

The answers for the following five lengths are determined by the length of each individual learner

3 m

own discretion

3.

Answers will depend on the individual answers obtained and processed.

4.

1. a tape on which measurements are indicated, with which certain lengths can be determined
2. an apparatus with which lengths with arcs, e.g. an athletics track, can be measured out
3. an apparatus that is calibrated according to the international linear measure of 1m
4. a flat or round stick, used to draw straight lines, usually also marked with units of measurement

2.2 Modern measuring instuments[2]

2.2.1 TECHNOLOGY

2.2.2 Grade 5

2.2.3 GRAPHIC COMMUNICATION

2.2.4 Module 5

2.2.5 MODERN MEASURING INSTRUMENTS

Measure and draw with modern measuring instruments

2.2.5.1 ASSIGNMENT 1:

2.2.5.2 Dimensions

2.2.5.3 [LO 1.3]

Measure the lengths in mm of the indicated line sections in the following sketch.

Which measuring-instrument is the most suitable?

[2] This content is available online at <http://cnx.org/content/m23421/1.1/>.

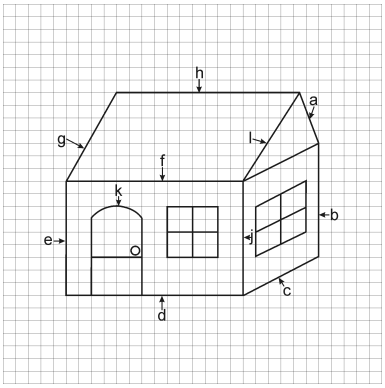


Figure 2.1

Hint for the Teacher:

Allow a margin of ± 2 mm to both sides, but encourage learners to measure accurately all the same.

Background:

What is a line section?

The line sections used to compile the sketch above are mainly HORIZONTAL, VERTICAL, DIAGONAL (slanting) or CURVED.

What is a horizontal line?

What is a vertical line?

What is a diagonal line?

What is a curved line?

2.2.5.4 ASSIGNMENT 2:

2.2.5.5 Look at the sketch at Assignment 1 and answer the following questions

2.2.5.6 [LO 1.3]

a. Write down the letters of any three horizontal lines in the sketch.
b. How many diagonal lines are there in the sketch?
c. Write down the letters of any two vertical lines in the sketch.
d. Draw over the HORIZONTAL lines in red, the VERTICAL lines in blue and the DIAGONAL lines in green in the sketch.
e. What kind of line is (k)? Can you measure the length of (k)?

How?

2.2.5.7 ASSIGNMENT 3:

2.2.5.8 Drawing lines with instruments

2.2.5.9 [LO 1.3]

Using a ruler and the four kinds of lines, design and draw any object on squared paper.

2.2.5.10 ASSIGNMENT 4:

2.2.5.11 Drawing of lines using instruments

2.2.5.12 [LO 1.8]

a. Draw a horizontal line of 50 mm with your ruler. Follow the instructions

(i) Draw a horizontal line across the page (about 150 mm).
(ii) Make a little vertical mark on the left of the horizontal line.
(iii) Place your ruler on the mark.
(iv) Measure 50 mm and make a small vertical mark on the right.
(v) Write 50 mm under the measured line section.

b) Draw a diagonal line of 70 mm with your ruler. Follow the instructions given above.

2.2.5.13 ASSIGNMENT 5:

2.2.5.14 Proportion

2.2.5.15 [LO 1.3]

Draw a line parallel to each of the following:

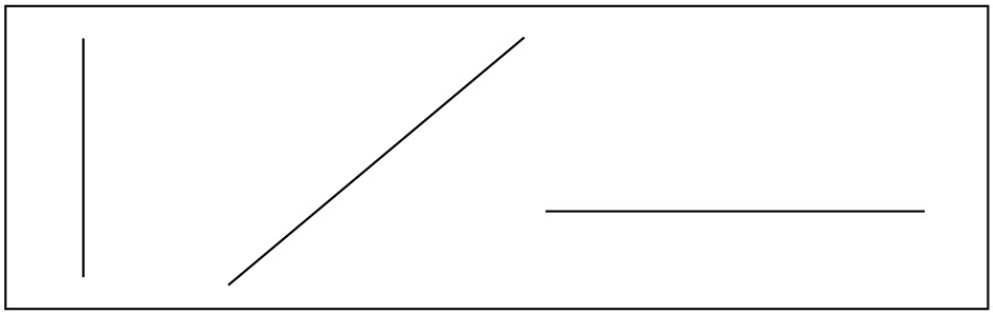


Figure 2.2

Background:
Complete: The point where two lines meet, is called a .The size of an angle is measured in DEGREES and we use a PROTRACTOR to measure the size of an angle.

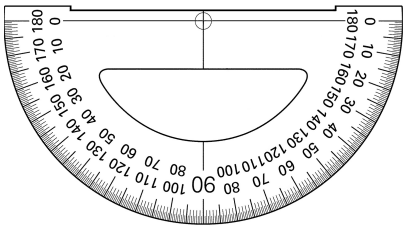


Figure 2.3

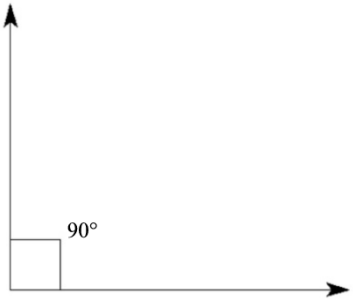


Figure 2.4

When a vertical line meets a horizontal line perpendicularly, a _ _ is formed. The size of such an angle is 90º.

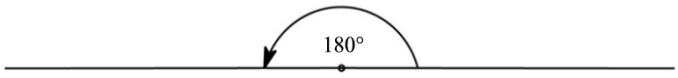


Figure 2.5

A line section can also be called a STRAIGHT ANGLE. The size of such an angle is 180º.

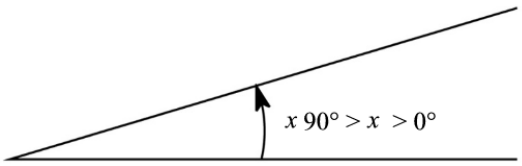


Figure 2.6

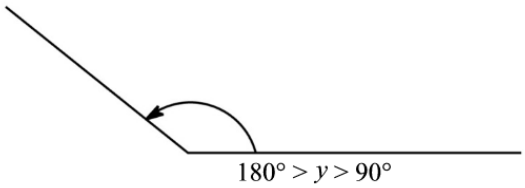


Figure 2.7

When an angle is between 0º and 90º, it is called an ACUTE ANGLE and when an angle is between 90º and 180º, it is called an OBTUSE ANGLE.

2.2.5.16 ASSIGNMENT 6:

2.2.5.17 [LO 1.2]

Write down what kind of angle each of the following is:

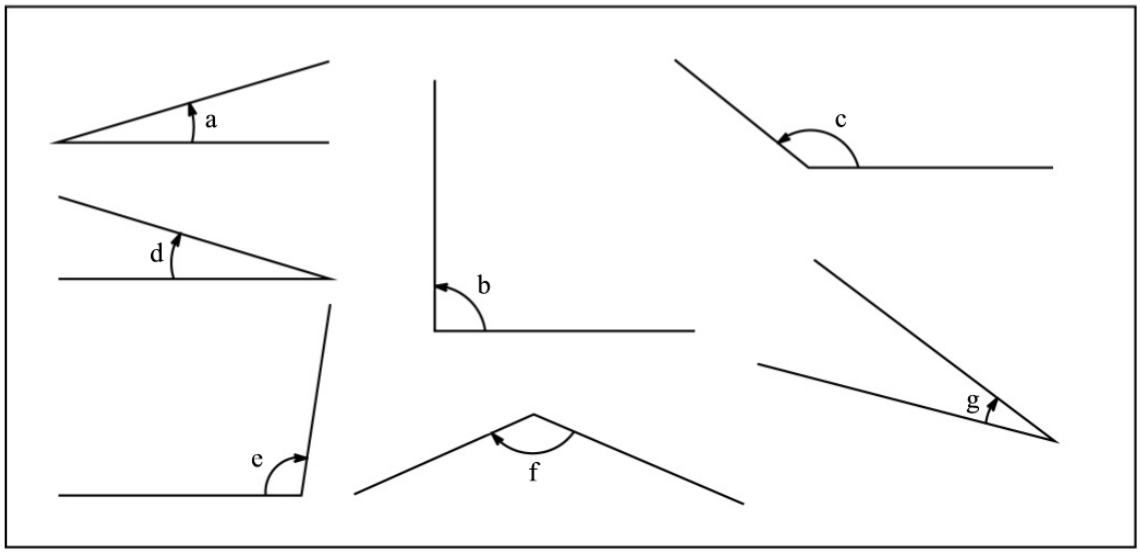


Figure 2.8

Hint:
Turn the page so that one side of the angle is horizontal, and decide then.

2.2.5.18 ASSIGNMENT 7:

2.2.5.19 Draw two examples of each kind of angle with your pencil or ruler.

2.2.5.20 [LO 1.3]

a. A right angle
b. An acute angle
c. An obtuse angle
Background:
If we combine certain line sections with the above-mentioned three angles, we get GEOMETRICAL FIGURES. They are also called two-dimensional shapes, because they are flat shapes or planes. Lines that are one-dimensional are used in drawings to form two-dimensional shapes or planes. Most two-dimensional figures have two dimensions, namely length and breadth.

2.2.5.21 ASSIGNMENT 8:

2.2.5.22 [lo 1.2]

Can you recognise these basic geometrical figures?

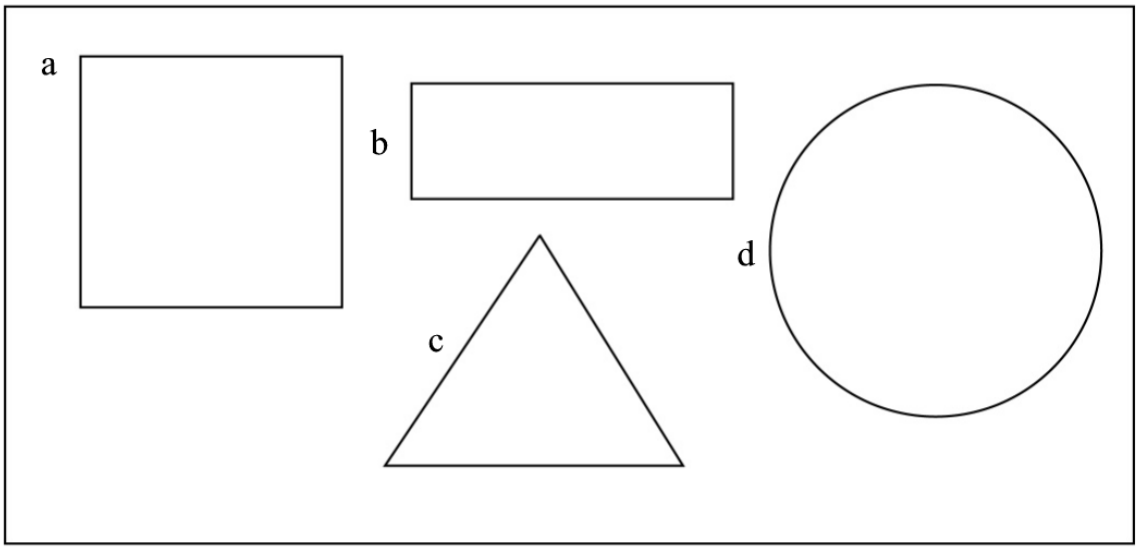


Figure 2.9

Write down the answers next to the right numbers.

2.2.5.23 ASSIGNMENT 9:

2.2.5.24 Drawing a figure

2.2.5.25 [LO 1.2]

Answer the following questions by writing down only the name of the correct geometric figure.

a. Which figure has four right angles each?
b. Which figure's four sides are of equal length?
c. Which figure has two pairs of equal sides?
d. Which figures' opposite sides are parallel?
e. Which figure has three acute angles?
f. Which figure has no angles?
g. Calculate the CIRCUMFERENCE of each figure in mm

(i)
(ii)
(iii)
(iv) (Hint: Use a length of wool.)
h. Use your pencil and a square grid (p. 15) and draw:

(i) a square with a circumference of 160 mm;
(ii) a square of which each of the sides is 50 mm;
(iii) a rectangle of which the length is 30 mm and the breadth is 50 mm;
(iv) a triangle of which one side is 40 mm and two sides are 30 mm each;
(v) a circle (without the grid).

(HINT: Here you may use any aid, or you may use a pair of COMPASSES.)
Background:
What is a pair of compasses?
The following parts of a circle are important: the centre, the radius and the diameter.
If you know the length or the radius or diameter of a circle, it is easy to draw a circle with a set of compasses.

2.2.5.26 ASSIGNMENT 10:

2.2.5.27 Draw circles with a set of compasses

2.2.5.28 [LO 1.8]

a. A circle with a diameter of 100 mm
b. A circle with a radius of 30 mm
Remember:
A set of compasses is not a toy and it could be dangerous if you don't handle it with care.

2.2.5.29 ASSIGNMENT 11:

2.2.5.30 Using a ruler and a pencil, re-draw the top design on squared paper

2.2.5.31 [LO 1.7]

2.2.5.32 ASSIGNMENT 12:

2.2.5.33 Proportion

2.2.5.34 [LO 1.8]

Try to re-draw the sketch in Assignment 11 on a clean page.
NB: All drawings must be done in pencil.
SELF-assessment of measuring and drawing with measuring-instruments
Self-assessment

1. The learner's performance does not meet the requirement of the LO.
2. The learner's performance partially meets the requirement of the LO.
3. The learner's performance meets the requirement of the LO.
4. The learner's performance exceeds the requirement of the LO.

2.2.5.35 ASSIGNMENT 13:

2.2.5.36 When you receive a copy of the assignment grid, make a tick under the appropriate number

	1	2	3	4
1. I am able to measure the lengths of line sections with a ruler.				
2. I am able to recognise a horizontal line.				
3. I am able to recognise a vertical line.				
4. I am able to recognise a diagonal line.				
5. I am able to recognise a curved line.				
6. I am able to draw a horizontal line with a ruler.				
7. I am able to draw a vertical line with a ruler.				
8. I am able to recognise parallel lines.				
9. I am able to recognise a right angle.				
10. I am able to draw a right angle with a ruler.				

continued on next page

11. I am able to recognise an acute angle.					
12. I am able to draw an acute angle with a ruler.					
13. I am able to recognise an obtuse angle.					
14. I am able to draw an obtuse angle with a ruler.					
15. I know what a geometrical figure is.					
16. I am able to recognise a square.					
17. I am able to draw a square with a ruler.					
18. I am able to recognise a rectangle.					

continued on next page

19. I am able to draw a rectangle with a ruler.					
20. I am able to recognise a triangle.					
21. I am able to draw a triangle with a ruler.					
22. I am able to draw a circle with a set of compasses.					
23. I am able to draw a circle without a set of compasses, but with a ruler.					

continued on next page

24. I am able to re-draw a two-dimensional design on squared paper with a ruler and set of compasses.					
25. I am able to re-draw a two-dimensional design from a squared page onto a clean page with a ruler and a set of compasses.					

continued on next page

Table 2.2

Dominant Code:		

Table 2.3

2.2.6 Assessment

LO 1

Technological Processes and Skills

The learner will be able to apply technological processes and skills ethically and responsibly using appropriate information and communication technologies.

We know this when the learner:

1.1 finds out about the background context (e.g. people, environment, nature of the need) when given a problem, need or opportunity and lists the advantages and disadvantages that a technological solution might bring to people;

1.2 finds out about existing products relevant to a problem, need or opportunity, and identifies some design aspects (e.g. who it is for, what it looks like, what it is for, what it is made of);

1.3 performs, where appropriate, scientific investigations about concepts relevant to a problem, need or opportunity using science process skills:

- planning investigations;
- conducting investigations;
- processing and interpreting data;
- evaluating and communicating findings;

- writes or communicates, with assistance, a short and clear statement (design brief) related to a given problem, need or opportunity that demonstrates some understanding of the technological purposes of the solution;

1.5 suggests and records at least two alternative solutions to the problem, need or opportunity that link to the design brief and to given specifications and constraints (e.g. people, purpose, environment);

1.6 chooses one of these solutions, giving reasons for the choice, and develops the idea further;

1.7 outlines a plan that shows the steps for making, including drawing or sketches of main parts;

1.8 uses suitable tools and materials to make products by measuring, marking out, cutting or separating, shaping or forming, joining or combining, and finishing the chosen material;

1.9 works neatly and safely, ensuring minimum waste of material;

1.10 evaluates, with assistance, the product according to the design brief and given specifications and constraints (e.g. people, purpose, environment), and suggests improvements and modifications if necessary;

1.11 evaluates the plan of action followed and suggests improvements and modifications if necessary;

1.12 produces labelled two-dimensional drawings enhanced with colour where appropriate.

LO 2

Technological Knowlede and Understanding

The learner will be able to understand and apply relevant technological knowledge ethically and responsibly.

We know this when the learner:

2.3 demonstrates knowledge and understanding of how to use energy sources to power mechanical systems in order to make a product move in some way.

LO 3

Technology, Society and the Environment

The learner will be able to demonstrate an understanding of the interrelationships between science, technology, society and the environment.

We know this when the learner:

3.1 recognises how products and technologies have been adapted from other times and cultures;

3.2 identifies possible positive and negative effects of scientific developments or technological products on the quality of people's lives and/or the health environment.

2.2.7 Memorandum

Assignment 1

rule

a – j: Answers are determined by the lengths of the line segments supplied by the illustrator.

Background

- a line drawn with a ruler and without curves
- a straight line running parallel to the horizon
- a straight line running perpendicular to a horizontal line
- a straight oblique line
- a line that runs in the shape of a curve

Assignment 2

(a) d; f; h

(b) 5

(c) e; j; b

(d) own discretion

(e) a curved line. With a piece of string/wool that you place on the curve and which you then measure with a ruler.

Assignment 3

Each learner could draw his/her own object

a 1Assignment 4

d 4

70 mm

b 25 e

3 c

Background

A line that runs parallel to another line and which never crosses it

Assignment 5

Background

- angle
- rectangle

Assignment 6

a) acute
b) right
c) obtuse
d) acute
e) right
f) obtuse

g) acute

Assignment 7

(a) own discretion, as long as it is a 90° angle

(b) own discretion, > than 0° and < than 90°

- own discretion, > than 90° and < than 180°
-

Assignment 8

(a) square

(b) rectangle

(c) triangle

(d) circle

Assignment 9

(a) square and rectangle

(b) square

(c) rectangle

(d) square and rectangle

(e) triangle

(f) circle

(g) (a) 33 mm x 4 = 132 mm (± 130 mm)

(b) 2 x 48 mm + 2 x 21 mm

= 96 mm + 42 mm

= 138 mm (± 140 mm)

(c) 42 mm + 42 mm + 48 mm = 172 mm

(d) 120 mm

(h) 1. a square with each side 40mm

2. a square with each side 50mm

3. a rectangle with length 50mm and breadth 30mm

4.

40 mm40 mm

30 mm

5. any circle is acceptable

Background

An instrument with two arms with which one can draw circles.

Assignment 10

1.

diameter should be 100 mm distance on compasses therefore 50 mm

2.

distance on compasses 30 mm

Assignment 11

Result is determined according to sketch

Assignment 12

Evaluate how accurately learner has done this with reference to the following questions:

- Was the size of the drawing determined?
- Were the parts drawn as a group?
- Were the correct measuring instruments used?
- Were the circles and curves drawn in proportion?
- Were the details completed?
- Were unnecessary lines erased?

Assignment 13

The teacher can determine the mark by appraising the learner in terms of his/her own impressions of his/her work.

2.3 Freehand drawing[3]

2.3.1 TECHNOLOGY

2.3.2 Grade 5

2.3.3 GRAPHIC COMMUNICATION

2.3.4 Module 6

2.3.5 FREEHAND DRAWING

Freehand drawing

Now we are going to see how well you are able to draw without geometry instruments. This is called FREEHAND DRAWING. Use a sharp HB pencil for each of the following assignments.

Are you left-handed or right-handed?

2.3.5.1 ASSIGNMENT 1:

2.3.5.2 [LO 1.3]

Draw parallel diagonal lines in each frame. Indicate the direction in which you draw the lines most easily with an arrow.

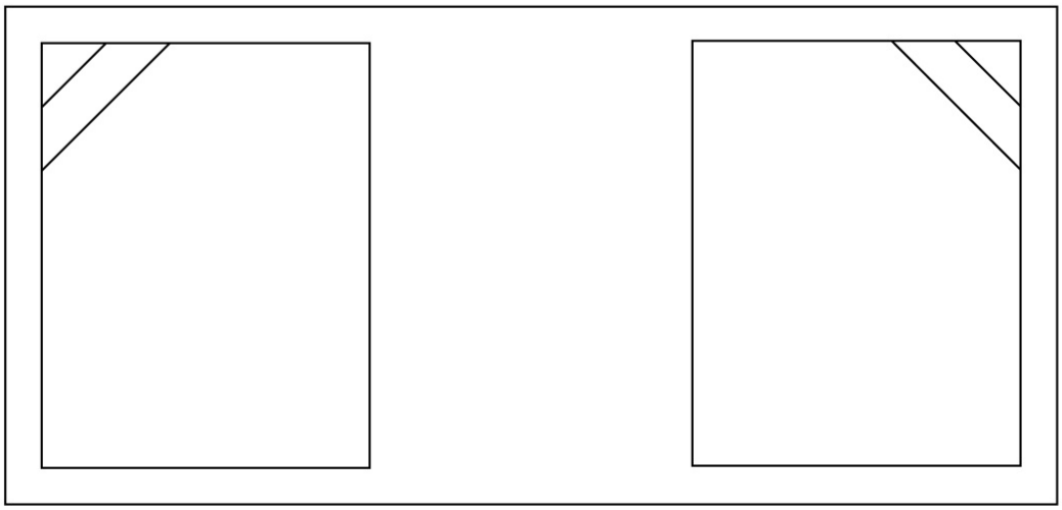


Figure 2.10

[3]This content is available online at <http://cnx.org/content/m23422/1.1/>.

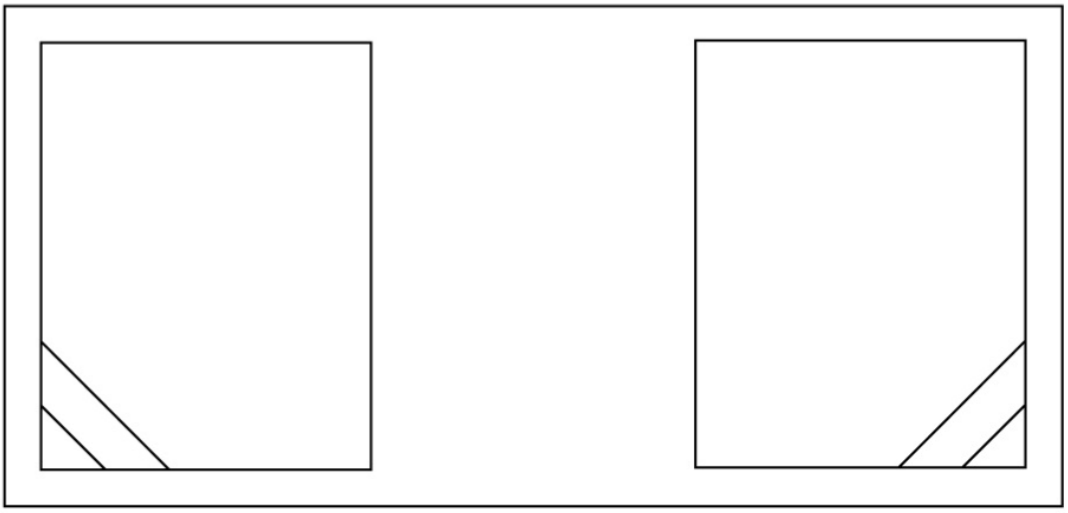


Figure 2.11

Interesting:

Is there any resemblance in which direction right-handed and left-handed learners find it the easiest to draw the lines?

2.3.5.3 ASSIGNMENT 2:

2.3.5.4 [LO 1.3]

Draw parallel horizontal lines in each frame. Also indicate the direction in which you draw the lines most easily, with an arrow.

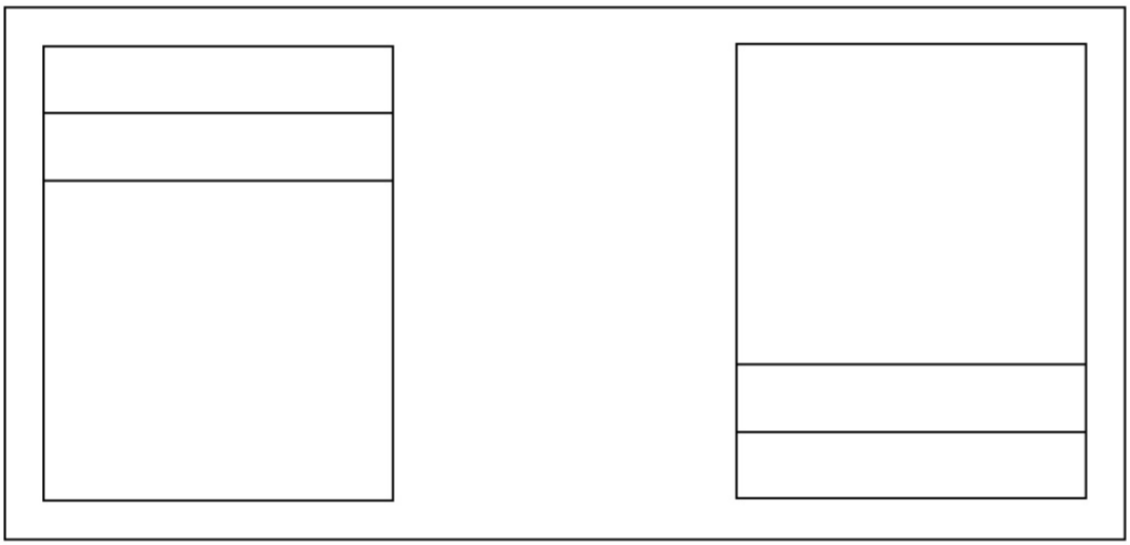


Figure 2.12

Interesting:
Is there any resemblance in the direction in which left-handed learners draw the lines the most easily?

2.3.5.5 ASSIGNMENT 3:

2.3.5.6 [LO 1.3]

Draw parallel vertical lines in each frame. Indicate with an arrow the direction in which you draw the lines most easily.

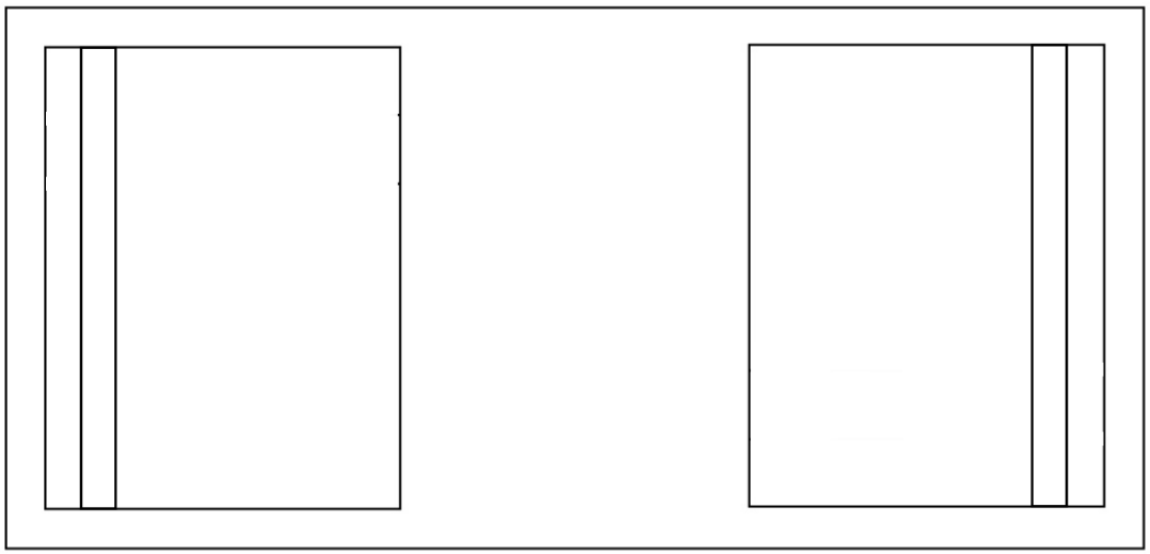


Figure 2.13

Interesting:
How do most right-handed learners draw the lines most easily?
How do most left-handed learners draw the lines most easily?

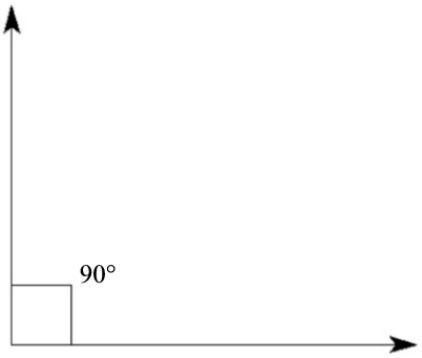


Figure 2.14

Background:
Once you are able to draw horizontal and vertical lines, you must try to draw RIGHT ANGLES.

2.3.5.7 ASSIGNMENT 4:

2.3.5.8 [LO 1.3]

Begin by drawing a vertical line and then draw a horizontal line at one of the points so that a right angle is formed. Draw fast and keep moving your hand while supporting it with the little finger if necessary. See how many right angles you are able to draw in a minute.

Background:

If you are capable of drawing right angles, you will be able to join right angles in order to form SQUARES, RECTANGLES and TRIANGLES.

If you draw a line, think only of its direction. Another line will determine its length.

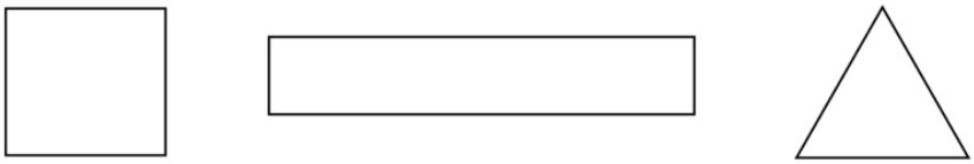


Figure 2.15

2.3.5.9 ASSIGNMENT 5A:

2.3.5.10 [LO 1.3]

Draw at least five squares of different sizes. (Experiment with the sequence in which you draw the sides by numbering the sides. Which way do you find the easiest? Circle it.)

2.3.5.11 ASSIGNMENT 5B:

2.3.5.12 [LO 1.3]

Draw at least five rectangles of different sizes. (Experiment with the sequence in which you draw the sides by numbering the sides. Which way do you find the easiest? Circle it.)

2.3.5.13 ASSIGNMENT 5C:

2.3.5.14 [LO 1.3]

Draw at least five triangles of different sizes. Experiment with the size of the angles.

Background:

The above-mentioned exercise is very important, since most of the objects that you will want to draw can be simplified and drawn as basic geometric figures. Therefore, in drawing a specific object you can use the geometric figures to form the framework.

Make a drawing of an object such as an animal by using an oval that developed from a rectangle

Figure 2.16

Let us practise drawing an oval or a circle with the aid of a square or a rectangle.
INSTRUCTIONS FOR A CIRCLE:

1. Draw a square as in Assignment 5A.
2. Mark half of each side with a small mark.
3. Join the marks with a slight curve in order to form a circle.
4. Draw the circle with a dark pencil.
5. Erase the lines of the square carefully.

2.3.5.15 ASSIGNMENT 6A:

2.3.5.16 [LO 1.3]

Draw at least three circles of different sizes by following the above-mentioned instructions.

Figure 2.17

Background:
INSTRUCTIONS FOR AN OVAL:

1. Draw a rectangle as in Assignment 5B.
2. Follow instructions 2 to 4 as in drawing a circle.

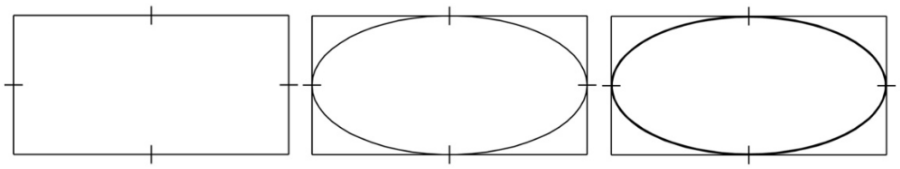


Figure 2.18

2.3.5.17 ASSIGNMENT 6B:

2.3.5.18 [LO 1.3]

Draw at least three ovals of different sizes by following the instructions.

2.3.5.19 ASSIGNMENT 6C:

2.3.5.20 [LO 1.3]

A challenge! Can you draw a circle with a diameter of 40 mm with a pencil and a ruler only? Try.

2.3.5.21 ASSIGNMENT 7A:

2.3.5.22 Make a poster in your group. Find pictures of ordinary objects and things that are examples of rectangles, squares, triangles and circles. Read the assessment questionnaire so that you know what is expected of you.

2.3.5.23 [LO 1.13]

2.3.6 Assessment

LO 1

Technological Processes and Skills

The learner will be able to apply technological processes and skills ethically and responsibly using appropriate information and communication technologies.

We know this when the learner:

1.1 finds out about the background context (e.g. people, environment, nature of the need) when given a problem, need or opportunity and lists the advantages and disadvantages that a technological solution might bring to people;

1.2 finds out about existing products relevant to a problem, need or opportunity, and identifies some design aspects (e.g. who it is for, what it looks like, what it is for, what it is made of);

1.3 performs, where appropriate, scientific investigations about concepts relevant to a problem, need or opportunity using science process skills:

- planning investigations;
- conducting investigations;
- processing and interpreting data;
- evaluating and communicating findings;

- writes or communicates, with assistance, a short and clear statement (design brief) related to a given problem, need or opportunity that demonstrates some understanding of the technological purposes of the solution;

1.5 suggests and records at least two alternative solutions to the problem, need or opportunity that link to the design brief and to given specifications and constraints (e.g. people, purpose, environment);

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1.7 outlines a plan that shows the steps for making, including drawing or sketches of main parts;

1.8 uses suitable tools and materials to make products by measuring, marking out, cutting or separating, shaping or forming, joining or combining, and finishing the chosen material;

1.9 works neatly and safely, ensuring minimum waste of material;

1.10 evaluates, with assistance, the product according to the design brief and given specifications and constraints (e.g. people, purpose, environment), and suggests improvements and modifications if necessary;

1.11 evaluates the plan of action followed and suggests improvements and modifications if necessary;

1.12 produces labelled two-dimensional drawings enhanced with colour where appropriate.

LO 2

Technological Knowlede and Understanding

The learner will be able to understand and apply relevant technological knowledge ethically and responsibly.

We know this when the learner:

2.3 demonstrates knowledge and understanding of how to use energy sources to power mechanical systems in order to make a product move in some way.

LO 3

Technology, Society and the Environment

The learner will be able to demonstrate an understanding of the interrelationships between science, technology, society and the environment.

We know this when the learner:

3.1 recognises how products and technologies have been adapted from other times and cultures;

3.2 identifies possible positive and negative effects of scientific developments or technological products on the quality of people's lives and/or the health environment.

2.3.7 Memorandum

Assignment 1 – 6C

Evaluate whether the learner has worked with insight and confidence. Physically observe how learners go about doing this assignment.

Assignment 7A

The groups' posters will vary.

2.4 Applying knowledge[4]

2.4.1 TECHNOLOGY

2.4.2 Grade 5

2.4.3 GRAPHIC COMMUNICATION

2.4.4 Module 7

2.4.5 APPLYING KNOWLEDGE

Case study:

[4]This content is available online at <http://cnx.org/content/m23428/1.1/>.

The long summer holiday is ahead and your family are not going anywhere. You are tired of all the old board games, and you don't want to spend your pocket money on new ones, because you are saving up to buy a new bicycle. Your mother suggests that you should design and make your own board games.

Research

2.4.6 ASSIGNMENT 1:

2.4.7 [LO 1.1]

What is the need?

2.4.8 ASSIGNMENT 2:

2.4.9 [LO 1.4]

Now write a clear, brief design brief for the manufacture of your article. Copy the senctence and replace the words in brackets by an appropriate word:

I am going to design and make a (**wha**t) for (**whom**) to use at (**where**) so that we (**its function**) it during the (**when**) .

2.4.10 ASSIGNMENT 3:

2.4.11 [LO 1.12]

You will have to do research in order to determine the necessary requirements for your board games.

Instructions to the Teacher:

1. Make a list of all the well-known board games by having a brainstorming session with the class. (Examples are snakes and ladders, Scrabble, Pictionary, Monopoly, etc.)

2. Let the learners do research in pairs. Each pair must research a specific board game and report back orally.

3. Learners can then combine the different ideas in designing and making their own board game.

Answer the following questions with reference to the games that you had to research.

a. What is the name of the game?
b. What is the size of the board on which the game is to be played? (Correct dimensions)
c. Name all the materials you will need to make such a board game.
d. Which tools will you need to make the game?
e. How has the necessary information been applied to the board to make it look creative and original?
f. Where have the rules of the game been inserted?
g. How many players are able to play the game at the same time?
h. What equipment (except the board) do you need in order to play the game?
i. What is the purpose of the game?
j. What preparations do you have to make before you start playing the game?
k. How is the game played? (Explain. Write at least five lines.)
l. How is the game presented/packaged?
m. For what age group is this game suitable?

2.4.12 ASSIGNMENT 4:

2.4.13 [LO 1.3]

Make notes of ideas that you might want to use and expand in your class workbook when your classmates present the games that they had to research and make.

2.4.14 Assessment

LO 1

Technological Processes and Skills

The learner will be able to apply technological processes and skills ethically and responsibly using appropriate information and communication technologies.

We know this when the learner:

1.1 finds out about the background context (e.g. people, environment, nature of the need) when given a problem, need or opportunity and lists the advantages and disadvantages that a technological solution might bring to people;

1.2 finds out about existing products relevant to a problem, need or opportunity, and identifies some design aspects (e.g. who it is for, what it looks like, what it is for, what it is made of);

1.3 performs, where appropriate, scientific investigations about concepts relevant to a problem, need or opportunity using science process skills:

- planning investigations;
- conducting investigations;
- processing and interpreting data;
- evaluating and communicating findings;

- writes or communicates, with assistance, a short and clear statement (design brief) related to a given problem, need or opportunity that demonstrates some understanding of the technological purposes of the solution;

1.5 suggests and records at least two alternative solutions to the problem, need or opportunity that link to the design brief and to given specifications and constraints (e.g. people, purpose, environment);

1.6 chooses one of these solutions, giving reasons for the choice, and develops the idea further;

1.7 outlines a plan that shows the steps for making, including drawing or sketches of main parts;

1.8 uses suitable tools and materials to make products by measuring, marking out, cutting or separating, shaping or forming, joining or combining, and finishing the chosen material;

1.9 works neatly and safely, ensuring minimum waste of material;

1.10 evaluates, with assistance, the product according to the design brief and given specifications and constraints (e.g. people, purpose, environment), and suggests improvements and modifications if necessary;

1.11 evaluates the plan of action followed and suggests improvements and modifications if necessary;

1.12 produces labelled two-dimensional drawings enhanced with colour where appropriate.

2.4.15 Memorandum

Research

Assignment 1

Something similar to an own/self-designed board game that will keep the children occupied during the winter holidays.

Assignment 2

Any answer that makes sense:

- Board game
- Our family/children
- Home
- Can stay occupied in a meaningful way
- Winter holidays

Assignment 3

Answers are determined by the relevant game that was researched.

Assignment 4

Answers are determined by respective games.

Design

Assignment 1

Learners should only take note of the specifications.

Assignment 2

The learners' sketches will vary – note the detail and the degree of difficulty.

Assignment 3

Chosen design for board game within the square of 5 cm by 5 cm will vary from learner to learner – look out for detail, interesting features, degree of difficulty and originality.

Assignment 4

Answers will vary – look out for originality.

Assignment 5

Answers will vary – look out for completeness, originality, creativity, conciseness, clear explanations.

Assignment 6

Learners should answer *Yes* with a reason, e.g.

6. a) Yes, to keep us children meaningfully occupied during the holidays, etc.

Production

Assignment 1

(Refer to Assignment 1 [requirements] under Design)

(a) (possible answers) thick cardboard; a clean, white page; wrapping paper; glue, an empty box

(b) measure, cut, draw, write, colour in, cover, glue, fold, trace, paste, store

(c) ruler, protractor, compasses, Koki pens, pencil, rubber, colouring-pencils, scissors, stencil

(d) answers may vary

(e) answers may vary

Assignment 2

Learner must answer these questions later and all answers should be very good.

Assignment 3

Redraw design five times bigger

Assignment 4

Assignment 5 of the design is now refined and rewritten.

Assignment 5

After completion of each learner's box, the teacher can assess the product by making use of the instructions (or each step that was followed).

Evaluation

Assignment 1

From the ticks made by the learners, a dominant code can be deduced. Learners are encouraged to have "very good" at each question.

Assignment 2

- Will vary.

Assignment 3

From the peer assessment, the teacher deduces a code to be allocated for a specific game.

2.5 Design[5]

2.5.1 TECHNOLOGY

2.5.2 Grade 5

2.5.3 GRAPHIC COMMUNICATION

2.5.4 Module 8

2.5.5 DESIGN

Background:
There are five principles with which a good design must comply, namely:

- It must have a function (purpose).
- It must have an attractive and interesting appearance.
- It must be made of the most suitable material.
- It must be sturdily constructed (put together).
- It must have a positive influence on people and their environment.

Design

2.5.6 ASSIGNMENT 1:

2.5.7 [lo 1.5]

Your board game must comply with certain requirements, namely:

- The board itself may not be any bigger than 30 cm by 30 cm.
- The board must be made of sturdy or thick cardboard.
- You must draw the plan of your game exactly, using as many measuring-tools as possible (ruler, protractor, and set of compasses). It must be drawn on a clean, white page of ± 25 cm by 25 cm.
- The back of the board must be covered with colourful wrapping-paper and the name of the game must be applied creatively. Then the plan must be pasted onto the front.
- One should be able to fold the board open at the start of the game, and close it again when one has to put it away.
- Any other accessories such as dice, buttons, etc., can be used, but all of it must be able to fit into an empty toothpaste box.
- At least one repeating geometric figure or two different geometric figures must be recognisable on the board.

2.5.8 ASSIGNMENT 2:

2.5.9 [lo 1.5]

Now make some freehand sketches of various ideas for your board game. Add labels. Sketch in pencil and do not erase. Keep the sketches simple and as practical as possible. Circle the ideas that you like.

[5] This content is available online at <http://cnx.org/content/m23435/1.1/>.

2.5.10 ASSIGNMENT 3:

2.5.11 [lo 1.6]

Make a complete and precise sketch of the shape of the board game in the following square. Sketch with pencil first and afterwards you can draw the lines in pencil. Using labels and inscriptions indicate how you intend to colour in / decorate the board game.

Final idea in the square in the centre

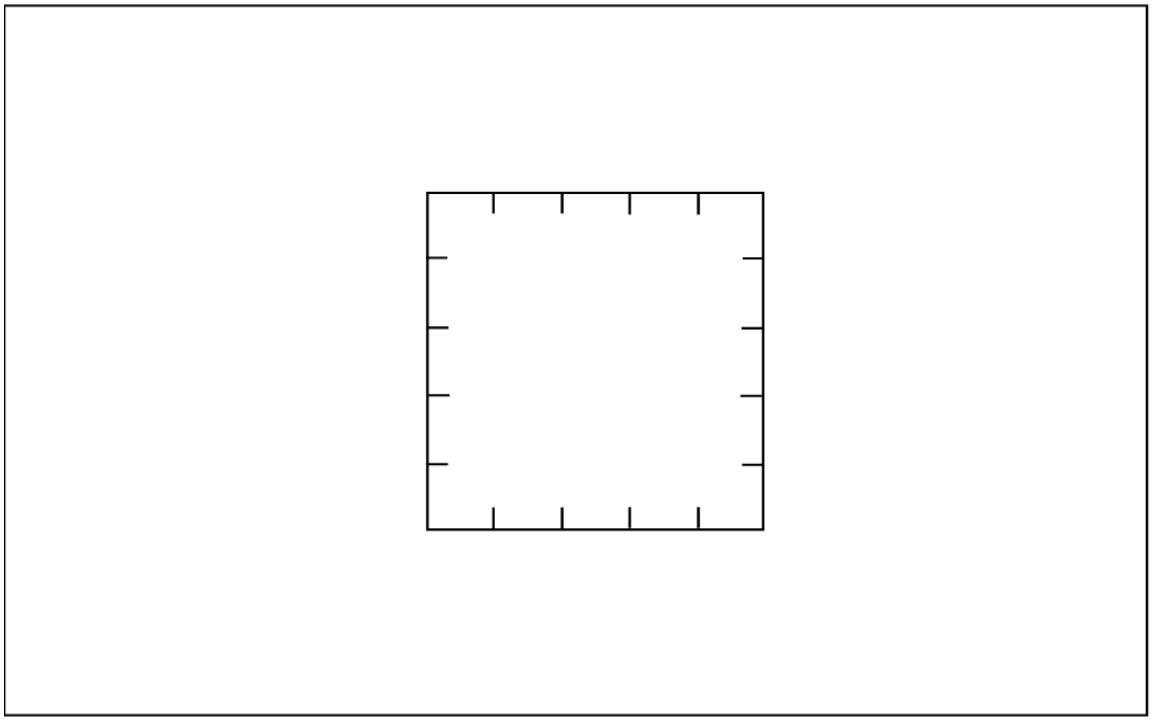

Figure 2.19

2.5.12 ASSIGNMENT 4:

2.5.13 [lo 1.6]

Create an original name for your board game. Write down all the possible names. Circle the name of your choice. Give a good reason for having chosen that name.

2.5.14 ASSIGNMENT 5:

2.5.15 [LO 1.7]

Compile a pamphlet on which you explain the rules of the game under the following headings.

a. Equipment:

b. The purpose of the game:
c. Preparation:
d. How the game is played:
e. Number of players:
f. How the winner is determined:

2.5.16 ASSIGNMENT 6:

2.5.17 [LO 1.10]

Does your design comply with the five basic principles for a good design? Motivate with reasons.

a. What is the purpose of your design?
b. Does your design have an attractive and interesting appearance?
c. Will your design be made of the most suitable material?
d. Will your design be put together in the most suitable way?
e. Does your design have a positive influence on people and the environment?

2.5.18 Assessment

LO 1

Technological Processes and Skills

The learner will be able to apply technological processes and skills ethically and responsibly using appropriate information and communication technologies.

We know this when the learner:

1.1 finds out about the background context (e.g. people, environment, nature of the need) when given a problem, need or opportunity and lists the advantages and disadvantages that a technological solution might bring to people;

1.2 finds out about existing products relevant to a problem, need or opportunity, and identifies some design aspects (e.g. who it is for, what it looks like, what it is for, what it is made of);

1.3 performs, where appropriate, scientific investigations about concepts relevant to a problem, need or opportunity using science process skills:

- planning investigations;
- conducting investigations;
- processing and interpreting data;
- evaluating and communicating findings;

- writes or communicates, with assistance, a short and clear statement (design brief) related to a given problem, need or opportunity that demonstrates some understanding of the technological purposes of the solution;

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1.8 uses suitable tools and materials to make products by measuring, marking out, cutting or separating, shaping or forming, joining or combining, and finishing the chosen material;

1.9 works neatly and safely, ensuring minimum waste of material;

1.10 evaluates, with assistance, the product according to the design brief and given specifications and constraints (e.g. people, purpose, environment), and suggests improvements and modifications if necessary;

1.11 evaluates the plan of action followed and suggests improvements and modifications if necessary;

1.12 produces labelled two-dimensional drawings enhanced with colour where appropriate.

2.5.19 Memorandum

Application of knowledge

Research

Assignment 1

Something similar to an own/self-designed board game that will keep the children occupied during the winter holidays.

Assignment 2

Any answer that makes sense:

- Board game
- Our family/children
- Home
- Can stay occupied in a meaningful way
- Winter holidays

Assignment 3

Answers are determined by the relevant game that was researched.

Assignment 4

Answers are determined by respective games.

Design

Assignment 1

Learners should only take note of the specifications.

Assignment 2

The learners' sketches will vary – note the detail and the degree of difficulty.

Assignment 3

Chosen design for board game within the square of 5 cm by 5 cm will vary from learner to learner – look out for detail, interesting features, degree of difficulty and originality.

Assignment 4

Answers will vary – look out for originality.

Assignment 5

Answers will vary – look out for completeness, originality, creativity, conciseness, clear explanations.

Assignment 6

Learners should answer *Yes* with a reason, e.g.

6. a) Yes, to keep us children meaningfully occupied during the holidays, etc.

2.6 Making[6]

2.6.1 TECHNOLOGY

2.6.2 Grade 5

2.6.3 GRAPHIC COMMUNICATION

2.6.4 Module 9

2.6.5 MAKING

2.6.6 ASSIGNMENT 1:

2.6.7 Planning

2.6.8 [LO 1.10]

PLANNING: Before we make the game, we have to do some thorough PLANNING.

a. Which materials am I going to use to make the board game?

b. Which actions will I be executing (e.g. cutting, pasting, etc.)?

c. Which tools will I use to make the game?

d. Here are some guidelines for the basic steps that have to be taken. Determine how much time you will need for each step if you have two hours available.

Steps	Time
1. Cut out cardboard of 30 cm by 30 cm.	
2. Cover cardboard with gift wrap.	
3. Draw design to scale on white paper.	
4. Colour / decorate board with pencils / pens / Koki pens.	
5. Cut out square of ± 25 cm by 25 cm.	
6. Paste square onto cardboard.	
7. Add name of game on the outside.	
8. Compile pamphlet containing rules.	
9. Cover toothpaste box with gift wrap that is glued onto it.	
10. Place rules and accessories in toothpaste box.	
	2 h

Table 2.4

e Before you make your final game, it is important for you to test it to make sure that it works. Draw a PROTOTYPE (example) roughly in your class workbook and play the game with a friend. This is the time to make the necessary changes. Write the change(s) here:

[6] This content is available online at <http://cnx.org/content/m23440/1.1/>.

2.6.9 ASSIGNMENT 2:

2.6.10 Now make the board of your board game

2.6.11 [LO 1.9]

The following factors must be taken into account:

- Do you work thoroughly and according to a plan without being too hasty?
- Do you affix the various parts carefully so that they will not come apart later?
- Do you measure accurately according to the requirements?
- Do you work in a logical order?
- Do you erase the pencil lines once you have drawn the final lines with a pen or Koki?
- Do you colour in evenly?
- Do you use the available materials sparingly?
- Are the cardboard surfaces on which you have to paste paper smooth and flat?
- Do I see to it that my work area is tidy?
- Is my work area well organised so that I can work as effectively as possible?

2.6.12 ASSIGNMENT 3:

2.6.13 Draw to scale

2.6.14 [LO 1.12]

Now you have to learn how to enlarge the plan of your game toscale.

Instructions

- Return to your final design under number 3.
- With a pencil and ruler divide this square into 25 small squares of 1 cm by 1 cm.
- Carefully draw a large square of 25 cm by 25 cm on the large sheet of white paper. Draw the frame with a permanent marking pen so that it is dark.
- With your pencil and ruler divide this square into 25 small squares of 5 cm by 5 cm.
- You are now ready to transfer your design onto the big white page in pencil. Draw the content of each little square in your small design in the corresponding squares on the large white sheet. It will, of course, be larger than on the initial sheet.

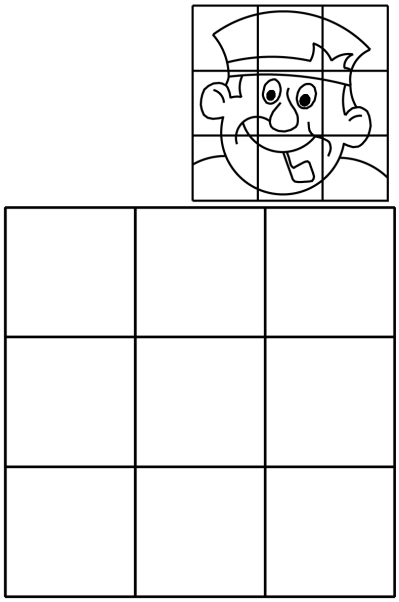

Figure 2.20

- Which electronic device is capable of enlarging your design? What is the advantage of using such a machine?
- If you are satisfied with your design you may draw the most important lines with a permanent marker so that they are dark.
- Now you may complete the colouring in or decorating of your product.

2.6.15 ASSIGNMENT 4:

2.6.16 [LO 1.8]

Three important requirements for the pamphlet containing the rules, are that the content must be neat, legible and without any spelling mistakes. With the teacher's permission you may type the pamphlet at home on a computer, and print it, or otherwise write it out neatly in print.

2.6.17 ASSIGNMENT 5:

2.6.18 [LO 1.7]

How do you cover a toothpaste box?

a. Open out the box carefully. Now you have a net.
b. Completely cover the outside of the box with good strong glue.
c. Place the net with the right side down on the wrong side of a sheet of wrapping paper of A4 size.
d. Gently rub out all air bubbles and see to it that the surfaces are all even. Wait for a while for the glue to dry properly. Put a large, heavy book on top.
e. Now cut all around the edges of the net and ensure that there is no superfluous wrapping paper.

f. Glue the box together as it was before you opened it out. Fold it into its original shape and let it dry. Make sure that the edges of the box are nice and even. Now you have an attractively covered box for your rules and accessories.

Evaluation

It is important to evaluate your work, not only to learn from your mistakes, but also to be able to feel proud when you have completed a task successfully.

2.6.19 Assessment

LO 1

Technological Processes and Skills

The learner will be able to apply technological processes and skills ethically and responsibly using appropriate information and communication technologies.

We know this when the learner:

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1.11 evaluates the plan of action followed and suggests improvements and modifications if necessary;

1.12 produces labelled two-dimensional drawings enhanced with colour where appropriate.

2.6.20 Memorandum

Assignment 1

(Refer to Assignment 1 [requirements] under Design)

(a) (possible answers) thick cardboard; a clean, white page; wrapping paper; glue, an empty box

(b) measure, cut, draw, write, colour in, cover, glue, fold, trace, paste, store

(c) ruler, protractor, compasses, Koki pens, pencil, rubber, colouring-pencils, scissors, stencil

(d) answers may vary

(e) answers may vary

Assignment 2

Learner must answer these questions later and all answers should be very good.

Assignment 3

Redraw design five times bigger

Assignment 4

Assignment 5 of the design is now refined and rewritten.

Assignment 5

After completion of each learner's box, the teacher can assess the product by making use of the instructions (or each step that was followed).

Chapter 3

Term 3

3.1 Introduction to structures[1]

3.1.1 TECHNOLOGY

3.1.2 Grade 5

3.1.3 DISCOVERING STRUCTURES

3.1.4 Module 10

3.1.5 INTRODUCTION TO STRUCTURES

BACKGROUND

Any object is a **structure** of some kind. Consult the dictionary to find the meaning of the word and write it down.

Assignment 1

3.1.5.1 What are structures used for?

Write down the answers in your workbook or on a sheet of paper: (Select from the following possibilities: bridge, a room, basket, cardboard box for apples, bookshelf)

A structure: a) contains objects, e.g. _ and/or

b) protects objects, e.g. _ and/or

c) supports objects, e.g. _ and/or

d) encloses space, e.g. _ and/or

e) stretches, over a distance, e.g. _

[LO 2.1]

A house is a structure that performs all the above functions. It contains furniture, protects its inhabitants and their possessions, supports the roof, encloses space and covers a certain area or surface.

Assignment 2

A structure must be able to support its own weight, as well as the mass that it has to carry, while still retaining its shape. A **mass** can be an object, a person, or a force. What is the mass in each of the following examples?

[1] This content is available online at <http://cnx.org/content/m25805/1.1/>.

Figure 3.1

Figure 3.2

Figure 3.3

[LO 2.1]
Assignment 3

3.1.5.2 How forces influence structures

What influence does a force have on a structure? Copy the complete sentence in your workbook or on a sheet of paper and supply the missing words.

a. It _ move objects.
b. It _ objects to move.
c. It changes the _ of movement.
d. It changes the _ of movement.
e. It changes the _ of objects.

[LO 2.1]
Assignment 4
The influence of a force is not always visible.
What are the causes of the main forces influencing parts of structures? Copy the senctences and supply the missing words (See assignment 2).

a. The _ that are brought to bear on the structure.
b. The _ of the structure itself.

[LO 2.1]

Assignment 5

Which two forces influence structures? Copy the sentence and supply the missing words:

a.

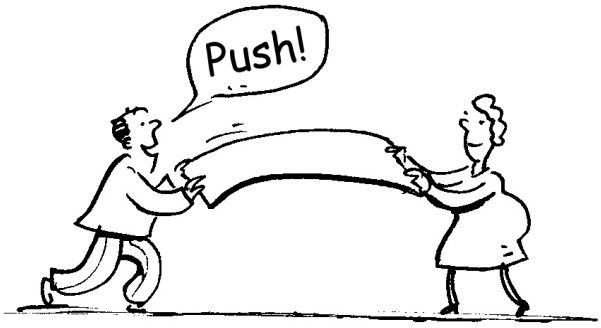

Figure 3.4

_ compresses part of a structure, attempting to push the sides closer together.

a. _ stretches part of a structure, trying to separate parts from each other.

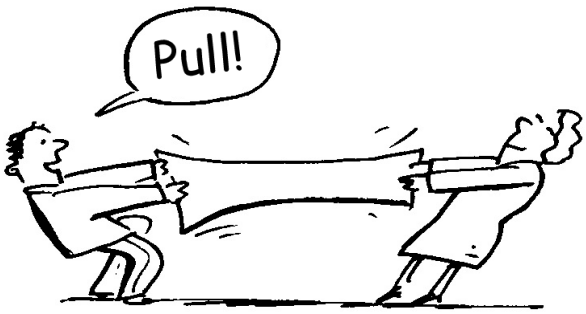

Figure 3.5

We say that part of the structure is in a _ or _ form.

Figure 3.6

The poles are compressed,or pressure is exerted.

Figure 3.7

The walls of the house are compressed, or pressure is exerted.

Figure 3.8

The chains of the swing are pulled,or pressure is exerted.It is called a tensile force.

Figure 3.9

The long chain and the two shorter links of this signboard are pulled,

or pressure is exerted.It is called a tensile force.

[LO 2.1]

Assignment 6

A force that affects a structure, may cause the parts of the structure to collapse or lose its shape. Now copy the following sentences and supply the missing words:

A part's resistance to a change of its shape, depends on

a) the _ of which it is made,

b) its _

c) its _

d) and the _ in which you try to bend it.

Structures should be _ , _ and _ so that it will not collapse or overturn when you place any kind of mass upon it.

[LO 2.1]

Assignment 7A

Let's investigate the vertical strength of shell structures:

Note to the teacher:

Divide the class into groups. Provide each group with six A4 Manila's of the same thickness, a can containing some nails, and a piece of flat, sturdy cardboard measuring 10 cm by 10 cm.

Assignment for each group:

Figure 3.10

Figure 3.11

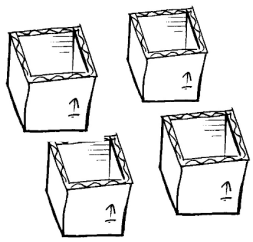

Figure 3.12

Figure 3.13

Figure 3.14

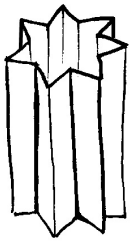

Figure 3.15

Fold each Manila sheet as illustrated in the sketches so that it will support the container with nails. Investigate all possibilities and decide which structure should support the heaviest mass. The height of your

structure should be equal to the width of the Manila. You may cut and fold the cardboard, using strips of masking tape of 5cm long to stick it together in five different places. The flat, sturdy piece of cardboard is then placed over this structure, with the container of nails on top. See which structure supports the largest number of nails. Make a tick ($\surd$) on the sketch of the structure that supports the largest mass.

What kind of force have we exercised on the cardboard? A _ force, because it compresses the cardboard. The parts of a structure on which force is executed, are called **supports** or **columns**.

Background

When supports are not strong enough to resist forces exerted on them, **they will collapse**. Very thin and tall supports or columns will buckle and collapse.

Assignment 7B

Do the same experiment, but use a sheet of folio paper instead of cardboard.

Assignment 8A

Let's investigate the horizontal strength of shell structures.

Note to the teacher:

Divide the class into groups. Provide each group with six A4 Manilas of the same thickness, two polystyrene glasses to serve as supports and a polystyrene glass containing a few nails to serve as the mass.

Assignment for each group:

Fold the Manila into structures that can resist a bending force. This structure is called a beam.

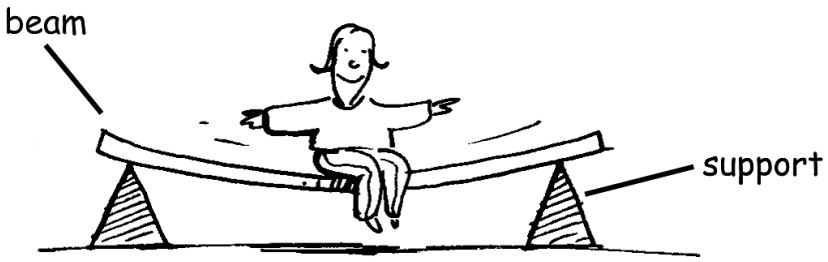

Figure 3.16

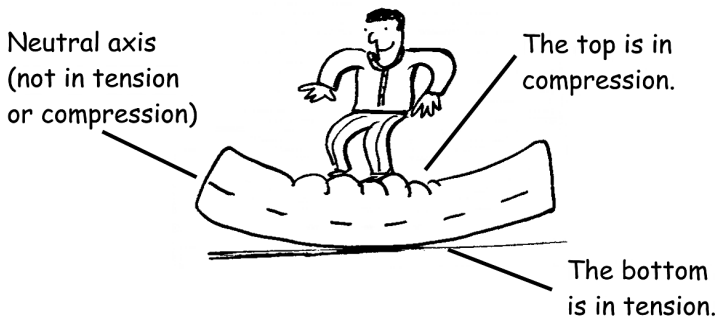

Figure 3.17

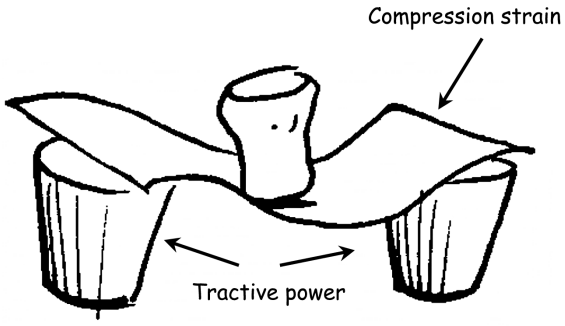

Figure 3.18

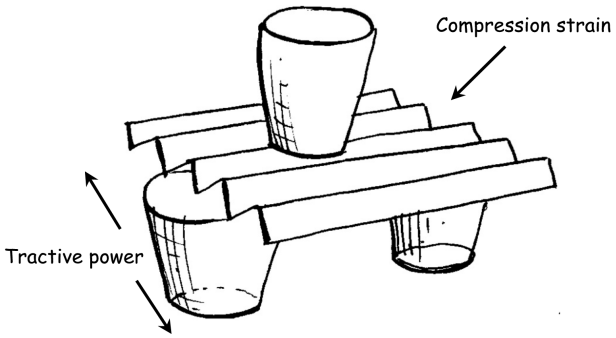

Figure 3.19

Do experiments with various structures and determine which one supports the largest number of nails. The length of the beam must remain the same as the original length. The nails exert pressure on the beam, while a pulling force in both directions is exerted on the lower part. Make a tick next to the beam that supports the largest number of nails.

Figure 3.20

Figure 3.21

Figure 3.22

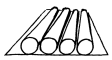

Figure 3.23

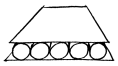

Figure 3.24

Figure 3.25

Assignment 8B
Now try the same experiment, using a folio page.
[LO 1.3]
Assignment 9
Application:
Why are there crinkles in tin cans, corrugated cardboard and corrugated iron?

Figure 3.26

Figure 3.27

Figure 3.28

[LO 3.2]
Assignment 10
Name three ways to make a 3-D structure more stable.

a. Use _ or _ to stabilise the structure.

b. Make the _ of the structure wider.

a. Make the _ of the structure .

A _ (underground, broad part) of a building makes the walls and other structures more stable.
[LO 2.1]
Background
Types of structures

- **shell** structure (provides support from the outside, strength lies in the shell, quite thin, mostly curved, hollow);
- **frame** structure (parts are joined, provides good support from the inside, is concealed);
- **solid** structure (completely made up of material, is reinforced).

Many of the structures that are manufactured, are a combination of frames, shells and solid structures. Some of them look like shells, but are in fact frames covered with thin material. This thin material is called the **sheet**.
Assignment 11
Copy and complete the following table by making a tick in the appropriate column.

	Structure	Shell	Frame	Solid
	A long bridge			
	A house			
	A telephone pole			
	A bicycle			
	A plastic tumbler			
	Ceramic tiles			
	A cardboard box			
	A dam wall			
	A cold drink can			
	Your skeleton			

Table 3.1

[LO 2.1]
BACKGROUND
Structures are either **natural** or **man-made**. Designers of certain structures are often inspired by nature.
Assignment 12
Use two A4 pages and paste pictures of at least five man-made structures on each page. Write next to each picture what type of structure it is, e.g. a shell, a frame, or a solid structure.
[LO 1.3]
Assignment 13
Find an example of a structure of which the design is probably based on a natural structure. Paste the picture or draw the example on a sheet of A4 paper.
[LO 1.3]
BACKGROUND
Frame structures are sections joined together to form a frame. Support is from the inside and the frame is concealed. A frame structure consists of different parts, which are referred to as structural parts.
Columns and beams
Certain frame structures have vertical supports. These are called **columns**.
Structures also have horizontal sections that are supported at the ends or in the length. These sections are called **beams**. Beams often distribute the mass over two or more columns.
Assignment 14
Study the pictures and supply the correct captions.

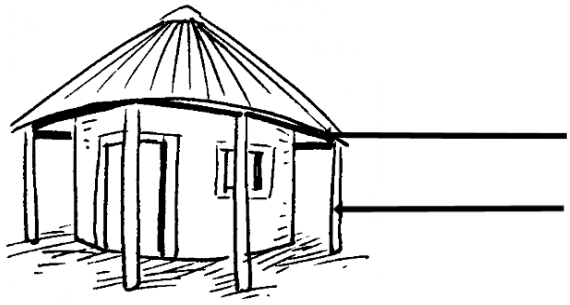

Figure 3.29

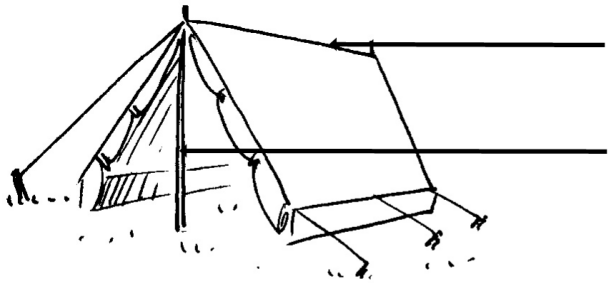

Figure 3.30

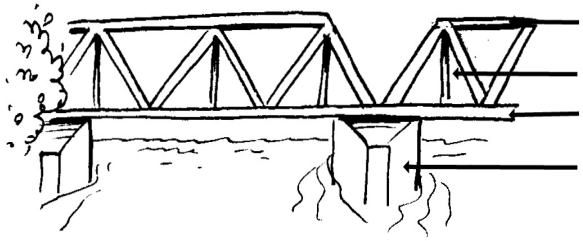

Figure 3.31

[LO 2.1]
BACKGROUND
Joining beams, Anchors and Supports

Anchors are used to keep the upright poles/supports/columns in position and prevent the columns from collapsing. Anchors are ropes, cables (metal ropes) or chains keeping a structure firmly in position by exercising a pull. A **joining beam** is another structural section that keeps other sections in position by a pulling action.

Frame structures have components called **supports**. Supports secure other sections in position by exerting pressure against them. Supports are made of material that will not bend, such as wood or steel.

Assignment 15

Supply the following sketches with the correct captions. Write down your answers, numbering them a) to c).

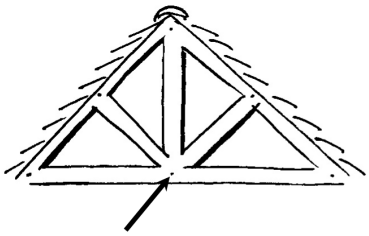

Figure 3.32

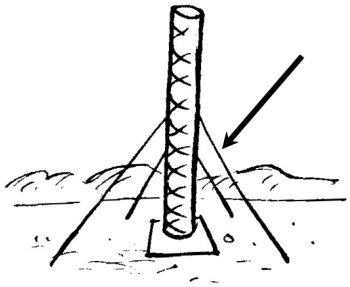

Figure 3.33

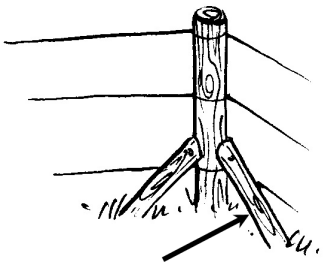

Figure 3.34

[LO 2.1]
BACKGROUND

In this module we will also look at SHELL STRUCTURES. Shell structures are mostly used to protect or enclose their content. They have no frame, for their particular shape makes them strong and stable enough to support themselves from the outside. Their strength thus lies in the shell itself.

Assignment 16

Figure 3.35

What did the Khoisan, the earliest inhabitants of our country, use to transport their food and stock? Copy and complete the following table:

	Content	Structure
	Arrows for the hunt	
	Water	
	Venison	
	Bulbs, tubes	
	Milk	
	Maize porridge	
	House	

Table 3.2

Choose from: clay pot, sheath, ostrich shell, skin satchel, branch fence

[LO 3.1]

Assignment 17

All materials used to make the above structures, were taken and used from the Khoisan's immediate surroundings. If any of the above should break, would it cause any pollution? Give a reason for your answer.

[LO 3.2]

BACKGROUND

From this activity you can gather that shell structures are often used for CONTAINERS. Nowadays products need to be packaged very carefully in order to reach their destination intact. Important information about the contents must also be indicated on the packaging. Creative packaging promotes the sales of the product.

Assignment 18A

Study a small cardboard box and answer the following questions.

(a) How many **sides** does the box have?
(b) How many pairs of opposite **sides** does the box have?

(c) How many **edges** does the box have?

(a) How many **corners** does the box have?
(b) How many **flaps** does the box have?

[LO 1.3]

Assignment 18B

Open up the box carefully by folding out the flaps and tearing along the joints. Iron the piece of cardboard and place it face down on an A4 page.

[LO 1.13]

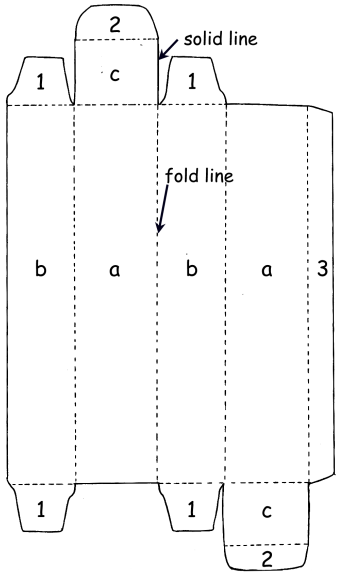

Figure 3.36

Assignmentent 18C

Draw the net (shape of the box folded open) on this page. Indicate the outer lines by means of solid lines and the folding lines by means of dotted lines. Mark the sides that are the same length with corresponding letters, and indicate the corresponding flaps by means of identical numbers, i.e. indicate the "pairs" (see example).

[LO 1.12]

Assignment 19

Paste the net facing upwards on an A4 page. Write the following captions on the page:

Heading : Information on packaging.

Captions : Name of product, manufacturer, description of product, mass or content, instructions, contact address, ingredients.

BACKGROUND

The information on the first packaging was applied by hand, and must have taken quite some time. Even the paper used for the packaging was hand-made.

At the end of the 15th century machines were built to manufacture paper and to decorate it with colourful designs. Packaging became cheaper and more suitable for commercial purposes.

Nowadays large manufacturers do their own packaging, using machines that do not only make the packaging, but also weigh the contents going into the container, as well as filling and sealing it.

Assignment 20

Do you know how paper is made? Supply the following sketch with the appropriate letters, referring to the description printed below. Write the letters in the numbered square.

A. A large roll of paper is obtained.
B. The pulp is mixed with bleaching agents.
C. The paper is heated by means of rollers so that it can dry.
D. The pulp is shaken to make the fibres cling together.
E. Rollers squeeze out the pulp to remove the remaining water and compress it further.

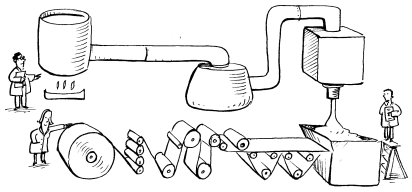

Figure 3.37

[LO 3.1]

Assignment 21

To the teacher:

Plan an outing with your learners to a local printing company or a factory where packing material is manufactured.

[LO 3.1]

BACKGROUND

A container is the most general form of packaging. The first containers were made of wood, but as it was difficult to print information on wood, the printing was done on paper and then pasted onto the wood. Nowadays cardboard containers are the most popular. The information can be applied directly onto the cardboard material.

Modern cardboard boxes are designed in many interesting shapes and sizes. Not only is the information on the cardboard boxes applied in an innovative fashion, but also the shapes of the cardboard boxes are impressive themselves.

Which shape is most commonly used for cardboard boxes?

Nowadays certain food companies package their products in decorated tins, as tins have also become collector's items. In such cases the item might often not be purchased for its contents, but for the packaging!

After decorated cookie tins had been made in the 1800's, people began to realise that tins make ideal containers for storing food. That is how the canning industry started. Paper labels are applied to the cans and discarded after use.

3.1.6 Assessment

LO 1

TECHNOLOGICAL PROCESSES AND SKILLS

The learner will be able to apply technological processes and skills ethically and responsibly using appropriate information and communication technologies.

We know this when the learner:

Investigates:

1.2 finds out about existing products relevant to a problem, need or opportunity, and identifies some design aspects (e.g. who it is for, what it looks like, what it is for, what it is made of);

1.3 performs, where appropriate, scientific investigations about concepts relevant to a problem, need or opportunity using science process skills;

Designs:

- writes or communicates, with assistance, a short and clear statement (design brief) related to a given problem, need or opportunity that demonstrates some understanding of the technological purposes of the solution;

Makes:

1.7 outlines a plan that shows the steps for making, including drawings or sketches of main parts;

1.8 uses suitable tools and materials to make products by measuring out, cutting or separating, shaping or forming, joining or combining, and finishing the chosen material;

Evaluates:

1.11 evaluates the plan of action followed and suggests improvements and modifications if necessary;

Communicates:

1.12 produces labelled two-dimensional drawings enhanced with colour where appropriate.

1.13 uses appropriate technologies to produce presentations that record and communicate the design process (e.g. simple portfolio, posters, charts, models).

LO 2

TECHNOLOGICAL KNOWLEDGE AND UNDERSTANDING

The learner will be able to understand and apply relevant technological knowledge ethically and responsibly.

We know this when the learner:

Structures:

- demonstrates knowledge and understanding of different types of structures (e.g. frame, shell, solid), and of the relationship between materials and the load a structure of a product can support.

LO 3

TECHNOLOGY, SOCIETY AND THE ENVIRONMENT

The learner will be able to demonstrate an understanding of the interrelationships between science, technology, society and the environment.

We know this when the learner:

Indigenous Technology and Culture:

3.1 recognises how products and technologies have been adapted from other times and cultures;

Impact of technology:

3.2 identifies possible positive and negative effects of scientific developments or technological products on the quality of people's lives and/or the health of the environment.

3.1.7 Memorandum

Assignment 1

(a) basket
(b) cardboard box for apples
(c) bookshelf
(d) a room
(e) a bridge

Assignment 2

Sketches a) an object b) a person c) a force

Assignment 3

(a) let
(b) prevent
(c) direction
(d) speed
(e) shape

Assignment 4

(a) loads
(b) strength / weight

Assignment 5

(a) buffing force
(b) pull

state of push or pull

Assignment 6

Bend

(a) material
(b) size
(c) shape
(d) method

strong, firm, stable

Assignment 7A

Buffing force

Assignment 9

The corrugations reinforce the structure and make it possible for the structure to carry its own weight and that of any possible load.

Assignment 10

(a) struts anchors
(b) ground level
(c) ground level heavier

foundation

Assignment 11

(a) frame
(b) shell
(c) solid
(d) frame

(e) shell
(f) solid
(g) shell
(h) solid
(i) shell
(j) frame
Assignments 12 and 13
Answers are determined by the pictures/sketches
Assignment 14
(a) beam
(b) beam
column
(c) beam
column
beam
Assignment 15
The answer depends on the sketch.
Assignment 16
(a) barrel
(b) clay pot
(c) skin pouch
(d) skin pouch
(e) clay pot
(f) clay pot
(g) shelter of branches
Assignment 17
No, natural substances that decompose in nature, as they are biodegradable (use own discretion).
Assignment 18A
(a) 6
(b) 3
(c) 12
(d) 8
(e) 3 (depends on the type of box)
Assignments 18B and C
Depends on the type of box used.
Assignment 19
Depends on the type of box used.
Assignment 20
1. F
2. B
3. D
4. E
5. C
6. A

3.2 Designing and making a container[2]

3.2.1 TECHNOLOGY

3.2.2 Grade 5

3.2.3 DISCOVERING STRUCTURES

3.2.4 Module 11

3.2.5 DESIGNING AND MAKING A CONTAINER

A. THE ASSIGNMENT

It is your best friend's birthday. You know that he/she is saving for a new bicycle and you have decided to rather give him/her money as a birthday present. You want to present it to him/her in a creative way, instead of simply slipping it into a plain envelope.

Copy and complete:

You must design a _ , attractively decorated, in which you can put the _ you want to give him/her on his/her _ . He/she must think it is a gift you bought, but will be surprised because it is money.

[LO 1.4]

A. RESEARCH

Assignment 1

Find five different square or rectangular containers that are suitable for giving the money, and display them on your desk.

[LO 1.2]

Assignment 2

Choose one of the containers and make a 3-D drawing of it in the space below. (An orthographic drawing: front elevation towards you.) Use colour and draw the detail on the container. Explain briefly why you have chosen the particular container.

[2] This content is available online at <http://cnx.org/content/m25806/1.1/>.

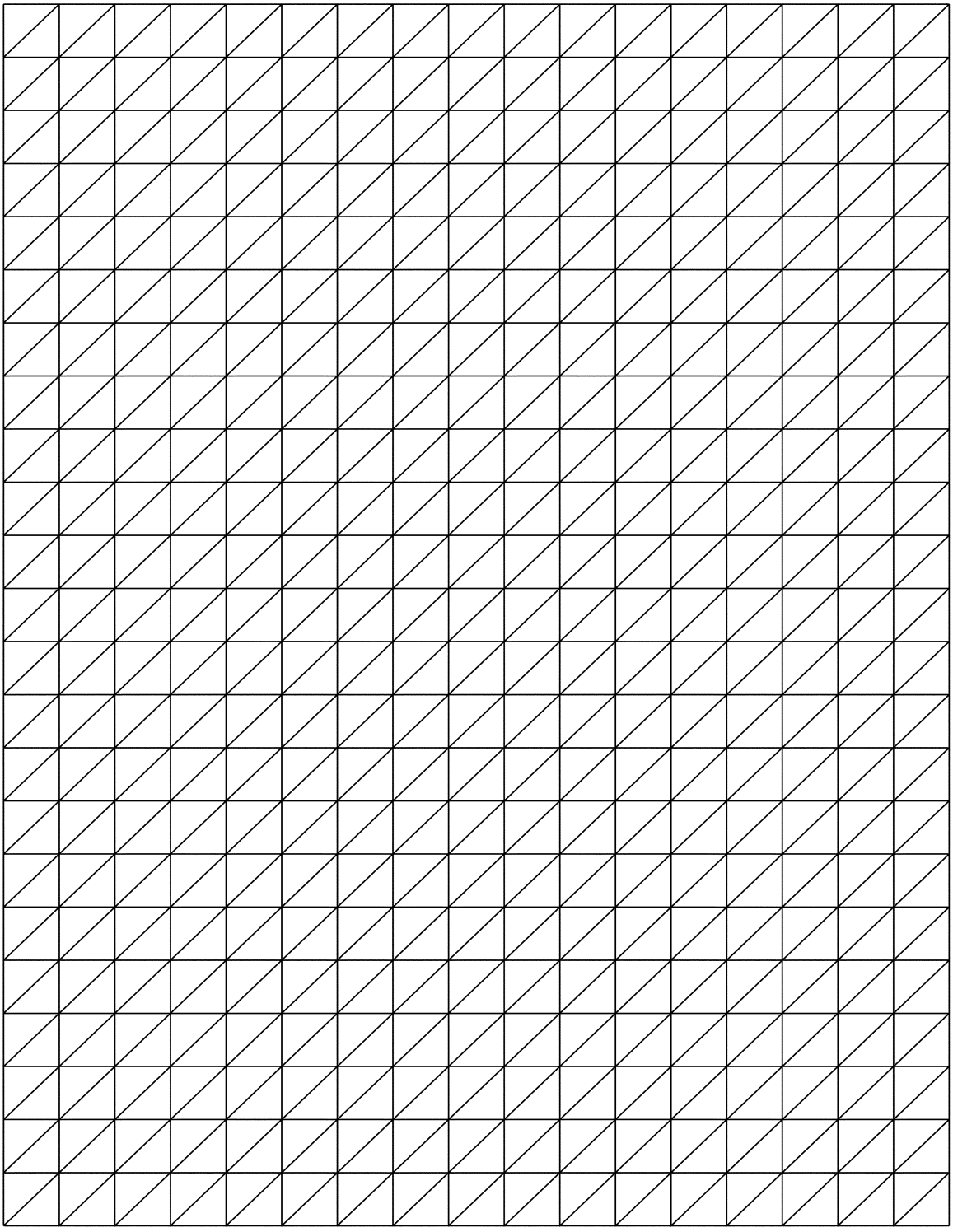

Figure 3.38

[LO 1.12]

Instead of spending too much money on making the container, you would rather use materials and tools that are available at home. You have decided on the following: a piece of A4-size cardboard, the template of a box from the grocery cupboard (Addendum 1), carbon copy paper, Alcolin glue, koki pens, a pencil, stapler, eraser and a stencil pattern.

A. DESIGN:

Assignment 1

Draw the box pictured on the left isometrically in the space on the right.

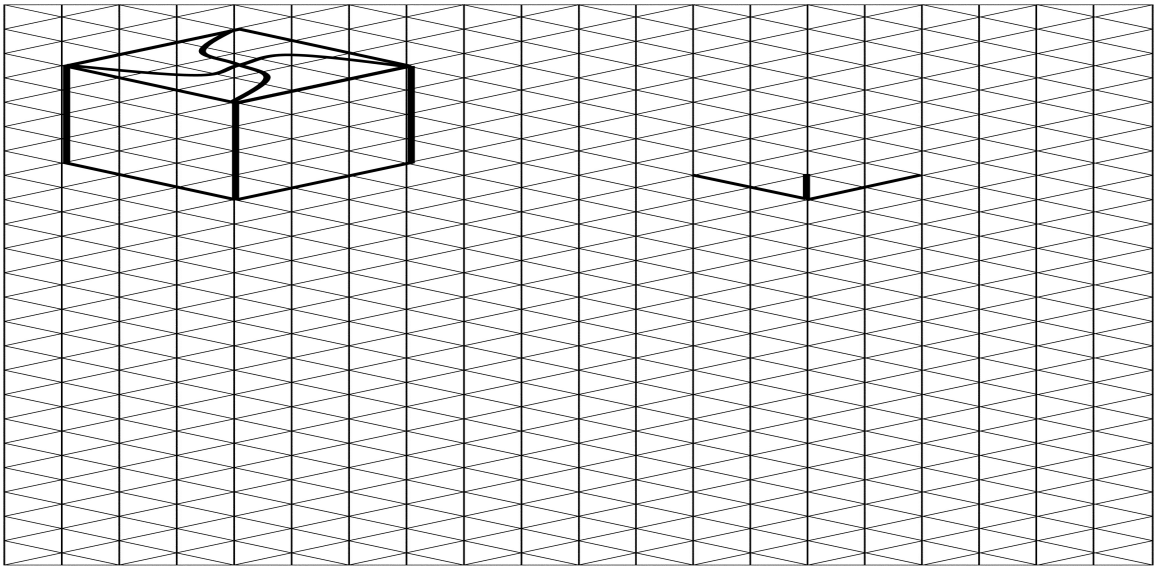

Figure 3.39

[LO 1.3]

Assignment 2

For interest's sake:

Also draw the following 3-D shapes isometrically. (Apply shading on the shapes on the left with colour pencils).

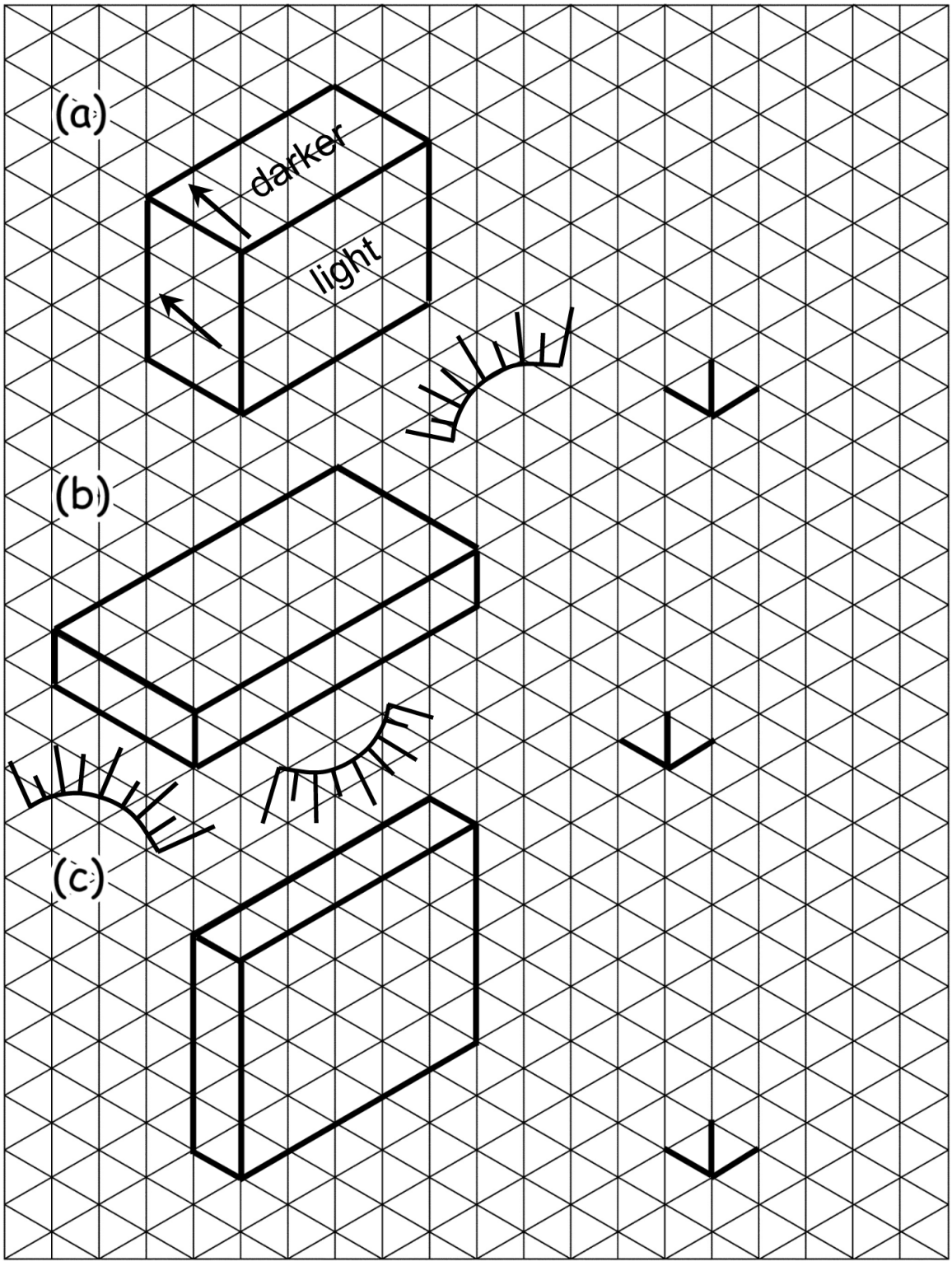

Figure 3.40

Key: Direction from where the light falls.
[LO 1.3]
Assignment 3
Draw oblique views (orthographic) of the following 3-D figures on the graph paper.

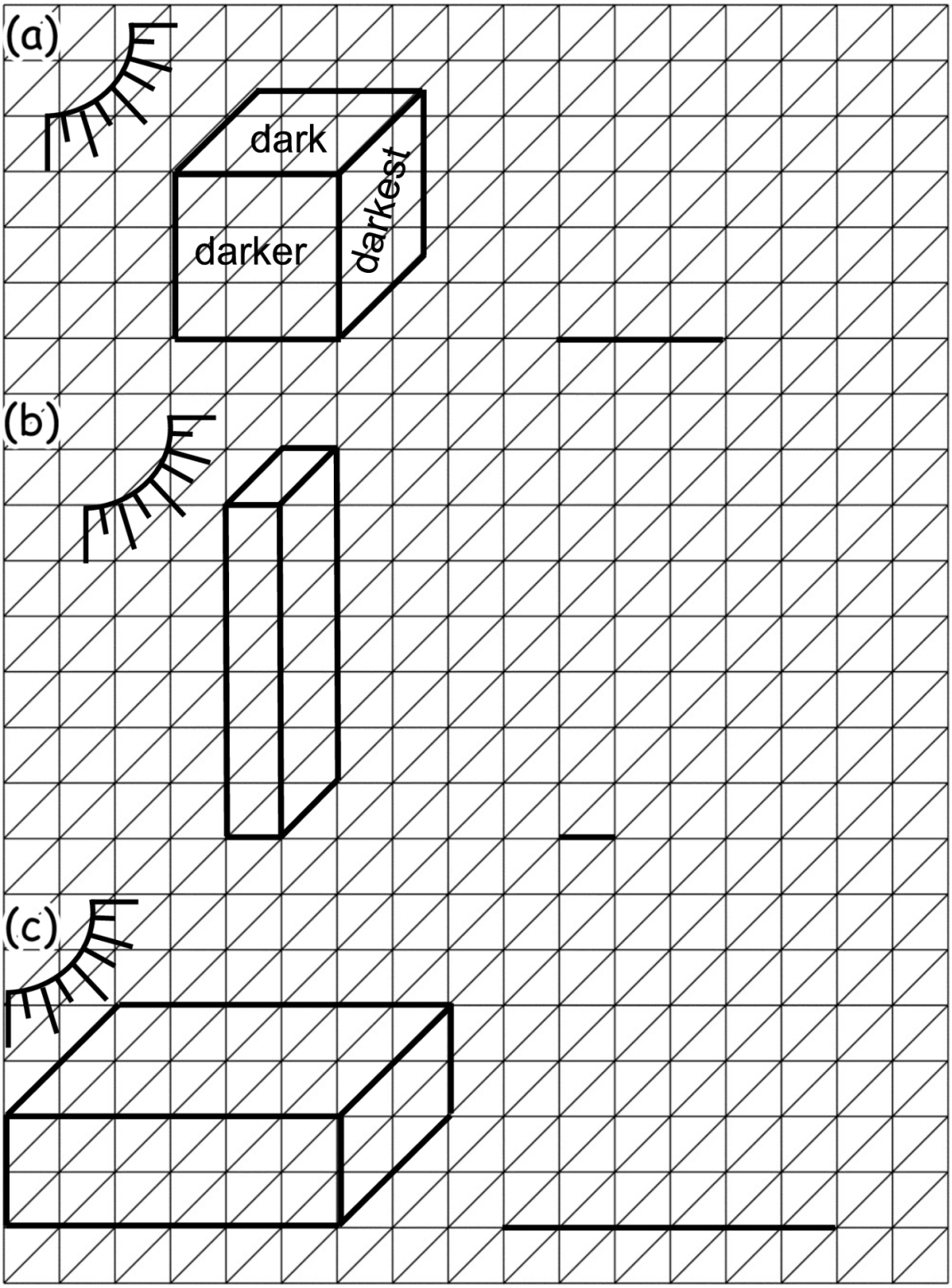

Figure 3.41

[LO 1.3]

Assignment 4

By using shading and colouring pencils, add dimension to the figures in assignment 3. The light falls from the top left, just behind the figures (a offers a clue).

[LO 1.3]

Assignment 5

Design a simple pattern to be used as a stencil for applying the pattern to the outside of your container in different coloured koki pens. Each design may not exceed 3 cm by 3 cm. Design a pattern in each of the following squares and circle your final choice in blue.

(Remember: keep the design simple, as you will be using sharp scissors to cut the pattern from a stencil-plate.)

A	B	C	D	E
F	G	H	I	J
K	L	M	N	0

Table 3.3

Assignment 6

Write down the correct answer:

(a) What type of line is easier to cut from plastic?

straight, bent

(a) What type of corner is easier to cut from plastic?

sharp, rounded

(a) Choose the most difficult design in red and give a reason for your answer:
(b) Choose any of your designs and write something negative and something positive about the particular design.

Your choice: [Letter]

[LO 1.10]

(a) Staple the stencil pattern on a sheet of paper or in your workbook after use.
(b) MANUFACTURING

Assignment 1

Copy the table and write down the problems you experienced after you have identified your needs.

Materials needed for	Kinds of material	Tools needed
Container		
Decoration		

Table 3.4

[LO 1.8]

Assignment 2

Follow the instructions carefully when making this container.

(a) Place *Appendix 1* (last page of module), the carbon copy-paper and the A4-cardboard in this order on top of each other. Staple them together with a stapler. Why?
(b) Answer the following questions on *Appendix 1*.

(i) How many uninterrupted curved lines are there?
(ii) How many uninterrupted straight lines are there?
(iii) How many straight dotted lines are there?
(iv) What is the difference between the dotted and uninterrupted lines?
(v) What is the function of the flap?

(a) Using a HB-pencil and a ruler, copy the 3-D figure on the cardboard.

Sequence: First draw the straight, uninterrupted lines, then the straight dotted lines and lastly the uninterrupted curved lines. Check if all of them have been drawn.

(a) Remove the staples and cut out the 2-D shape along the uninterrupted lines.
(b) Notch the dotted lines on the side with the carbon copy markings, using scissors and a ruler. Work on a suitable surface; practise first so that you do not make the notches too deep.
(c) Fold on the dotted lines, using a ruler.
(d) Apply the stencil design with a felt-tipped pen and your favourite stencil on the right hand side.
(e) Apply wood glue to the back of the square flaps and to the vertical side of the narrow flap towards the right hand side, and model the 3-D container. Hold firmly in position so that the container can dry properly. (Do not use too much wood glue. The surface must just be slightly sticky.)
(f) Fold the four shell edges over **one another** to close the sides of the box.

[LO 1.7]

A. ASSESSMENT

Assignment 1

Ask somebody in your class who is not a friend of yours to answer the following questions about your completed container as honestly as possible. If his/her answer is NO, your partner must write down a reason(s). If the answer is YES, he/she must explain briefly.

(a) Has the stencil pattern been applied neatly to the outside of the container?
(b) Is the container decorated in a colourful fashion?
(c) Are the flaps glued together properly?
(d) Does the container have an attractive shape and does it stand square?
(e) Has the carton been notched deep enough?
(f) Are any carbon copy markings visible on the outside?
(g) Has the container been cut out neatly and smoothly?
(h) What is your impression of the container?

[LO 1.10]

Evaluated by _ _ _ _

Assignment 2

Complete: If I had to make this container again, I would

[LO 1.11]

Assignment 3

Assignment for the teacher:

Display the containers assisted by the learners in the entrance hall of the school and reward the learners for their efforts.

Appendix 1

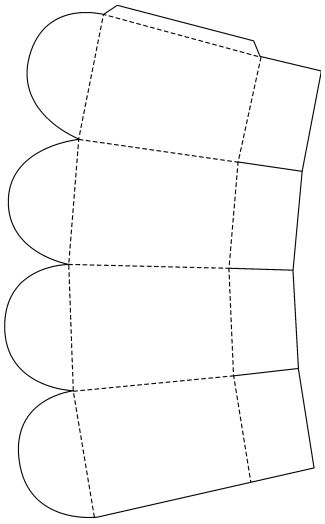

Figure 3.42

3.2.6 Assessment

LO 1

TECHNOLOGICAL PROCESSES AND SKILLS

The learner will be able to apply technological processes and skills ethically and responsibly using appropriate information and communication technologies.

We know this when the learner:

Investigates:

1.2 finds out about existing products relevant to a problem, need or opportunity, and identifies some design aspects (e.g. who it is for, what it looks like, what it is for, what it is made of);

1.3 performs, where appropriate, scientific investigations about concepts relevant to a problem, need or opportunity using science process skills;

Designs:

- writes or communicates, with assistance, a short and clear statement (design brief) related to a given problem, need or opportunity that demonstrates some understanding of the technological purposes of the solution;

Makes:

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1.8 uses suitable tools and materials to make products by measuring out, cutting or separating, shaping or forming, joining or combining, and finishing the chosen material;

Evaluates:

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Communicates:

1.12 produces labelled two-dimensional drawings enhanced with colour where appropriate.

1.13 uses appropriate technologies to produce presentations that record and communicate the design process (e.g. simple portfolio, posters, charts, models).

LO 2

TECHNOLOGICAL KNOWLEDGE AND UNDERSTANDING

The learner will be able to understand and apply relevant technological knowledge ethically and responsibly.

We know this when the learner:

Structures:

- demonstrates knowledge and understanding of different types of structures (e.g. frame, shell, solid), and of the relationship between materials and the load a structure of a product can support.

LO 3

TECHNOLOGY, SOCIETY AND THE ENVIRONMENT

The learner will be able to demonstrate an understanding of the interrelationships between science, technology, society and the environment.

We know this when the learner:

Indigenous Technology and Culture:

3.1 recognises how products and technologies have been adapted from other times and cultures;

Impact of technology:

3.2 identifies possible positive and negative effects of scientific developments or technological products on the quality of people's lives and/or the health of the environment.

3.2.7 Memorandum

A. Assignment 1

container, money, birthday

B. Assignment 1 and 2

Own discretion

C. Assignment 1 to 5

Own discretion

Assignment 6

(a) curved (c) own discretion (d) own discretion (e) own discretion

D. Assignment 1

CONTAINER	
Types of material	**T ools**
a pencil; a rubber; a sheet of A4 cardboard; white glue; a stencil; carbon paper	scissors; a metal ruler; a stapler

Table 3.5

DECORATION	
Types of material	tools
Koki pens	a stencil pattern

Table 3.6

Assignment 2

(a) not moved

(b) 1. 4

(b) 2. 12

(b) 3. 12
(b) 4. cut out on continuous lines. Notch on dotted lines
(b) 5. to shape box / glue together
E. Assignment 1
Own discretion
Assignment 2
Own discretion
Assignment 3
Own discretion

Chapter 4

Term 4

4.1 Discovering textile fabrics[1]

4.1.1 TECHNOLOGY

4.1.2 Grade 5

4.1.3 PROCESSING MATERIALS

4.1.4 Module 12

4.1.5 DISCOVERING TEXTILE FABRICS

4.1.6 Background information

People have worn clothes as protection from the elements (heat and cold) since the earliest times of the Stone Age (12 000 B.C.). Stone Age people used animal pelts and parts of plants to make clothes, which means that they used things that occurred naturally in their environment. Animal pelts were joined together with sinews and needles made from bone to make simple garments. Seeds, feathers and husks were used as simple decorations.

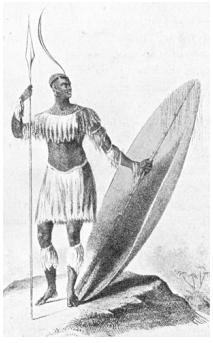

Figure 4.1

Assignment 1

[1] This content is available online at <http://cnx.org/content/m25804/1.1/>.

Here you have a sketch of Shaka, the Zulu king who lived in 1825. Consult a reliable source to get the information you need and describe the traditional garments of a Zulu warrior and the material that was used to make each part of his outfit.

[LO 3.1]

Assignment 2

Would you wear a coat made from the pelt of a jaguar nowadays? Provide reasons for your answer.

[LO 3.2]

4.1.7

4.1.8 Background information

The people of Ancient Egyptian started to weave textiles during the Bronze Age (3 000 B.C.). Textile fabrics can be woven from fibres obtained from animals (silk and wool) or plants (cotton and linen) and are used to make coverings and decorations like clothes, mats, blankets, curtains, etc. The development of technology made it possible to use many other fibres and materials to make textiles, so that we nowadays make textiles from textile fibres found in nature (from plants and animals) or from materials made by people (from wood, oil and coal). We therefore have natural and manmade (synthetic) textile fabrics. The first textile fabrics made of plastics (rayon, polyester, nylon, viscose) were produced in England, round about 1850. The manmade synthetic yarns are manufactured in factories, from oil or coal. Chemicals are extracted from these minerals and are made into plastic fibres.

4.1.9

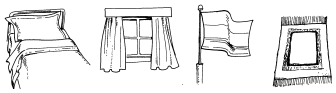

Figure 4.2

Assignment 3

Sort each of the following objects into natural or manmade: a plastic bag, a fur coat, a wooden bowl, a glass bottle, a polystyrene container, a wooden table.

NATURAL FABRICS	MANMADE FABRICS

Table 4.1

4.1.10 [L [LO 3.1]

4.1.11 Background information

The advantages of plastics are:

- It is cheaper to manufacture.
- It can be processes into many different forms.
- It can be dyed easily.
- It is very durable.
- It lasts very long.

4.1.12 Disadvantages of plastics:

- It cannot be recycled readily.

4.1.13 Natural fabrics

Natural fabrics can be of animal, plant or mineral origin. Examples of animals that provide fibres for fabrics are sheep, goats, rabbits, camels, silkworms, llamas and horses. Plant fibres are obtained from the bark, leaves, seeds and fruit of particular plants, like cotton, sisal and flax, and coconut fibre from coconuts.

Wool is obtained from sheep by shearing the sheep annually. A sheep provides about four kilograms of wool per year. There are different breeds of sheep and they provide different types of wool. The wool from merino sheep is regarded as the finest and as the best as far as quality is concerned. Merinos are bred mainly in Australia and South Africa because they do very well where the climate is warm and dry. Australia is one of the top wool producing countries in the world.

Assignment 4

Research task

Find information and read it to find out as much as you can about the process of wool production from when the fleece is shorn off the sheep to when the wool has been made into the cloth that is used to make clothes. Represent the process on a poster, by means of a flow chart. In addition, use any other animal or vegetable matter that you prefer.

Silk obtained from the silkworm (Bombyx mori) was probably first made into The earliest use of cotton was recorded in India, where it was grown and made into cloth long before the birth of Christ (LO 1). From India, knowledge of how to grow cotton was gradually spread through Persia, Egypt and Europe and then to North America.

Silk obtained from the silkworm (Bombyx mori) was probably first made into cloth in China, about 4 000 years ago. Silk is warm to wear, smooth, very light, strong and resilient, which means that it can shed creases. It is ideal for use by doctors, in the sciences and in technology.

Examples:

- Clothing for space travellers is made of silk.

- Silk is used to make tennis racket strings and fishing line.
- Wounds are stitched with thread made of silk.

Silk is still obtained from the cocoons of silkworms. A cocoon actually consists of a single thread that may be up to five kilometres in length. More than 40 000 cocoons are required for one kilogram of silk. In early times spinning was done by hand, but it is done with machines nowadays.

4.1.14 Background information

The fur and pelts of animals camouflage them so that their enemies can identify them less easily. A chameleon is a good example of an animal that depends on camouflage.

People have recognised the value of camouflage, especially for military purposes (battle dress and military equipment.

It has even become fashionable to wear clothing patterned with camouflage markings and printed with the markings found on animals.

Assignment 5

Collect pictures of such clothing from newspapers and old magazines and paste them on a sheet of paper or in your workbook, or draw a picture of such garments. Write labels to explain which patterns come from which animals, if they are recognisable.

[LO 3.2]

4.1.15 Background information

Some of the qualities of textile fabrics can only be determined under particular conditions, when you apply particular tests. These qualities are referred to as hidden qualities. They are qualities such as strength, inflammability, absorbency, and conductivity. Hidden qualities can change the nature of an object totally.

Other qualities are easier to detect simply by looking at, or feeling or smelling the object.

Assignment 6 A

INVESTIGATION A

To the Educator:

Divide the class into groups. Let each group investigate a different quality of textile fabrics.

Assignment

Provide each group with examples of nylon, polyester, cotton, silk and woolen fabric.

Sort the pieces of textile fabric (cloth) that your educator provides into two categories according to their qualities, i.e. according to whether they are natural or synthetic. Test each of the following qualities with the use of some reliable scientific method.

a) *Strength:* Try to tear the cloth and make a note of whether it is easy to tear or not.
b) *Flammability*: For this you will have to remember that working with fire is dangerous, because you may get burnt. You should keep a first aid kit at hand and work under supervision of your educator. You will need a pair of tongs, a candle, matches and a sheet of metal.

Set a corner of each piece of cloth alight and take note of the following:

Does it burn or smoulder? Does it burn quickly or slowly? Does it burn to ashes (a soft dust) or does it melt and form a hard pellet? Smell and feel the fabric after it has been burnt and cooled down. Does it smell like burnt paper or is there an acrid smell like chemicals?

a) *Absorbency:* You will need water, a measuring jug, a bowl and a stopwatch. Lay the cloth in the bowl. Pour 50 ml of water on the cloth and check how long it takes for the cloth to get soaked. Does it happen fairly quickly or fairly slowly?
b) *Colour:* Write down what the colour of the cloth is.
c) *Durability:* For this you will need a brick. Rub each of the pieces of cloth back and forth against the brick. Count how many times you have to do this before the cloth is weak enough to be torn / worn through.
d) *Appearance:* Describe the textile fabric. Is it coloured in plain colours, dark, light, or pastel colours, or patterned with stripes, checks, floral emblems, etc.?
e) *Texture:* Feel it. Is it smooth, elastic, woolly, coarse, rough, corded, crunched?
f) *Feel:* Is it soft and flexible or stiff?
g) *Warmth:* Does it feel warm or cool?

Copy the following table, and complete:

4.1.16 Textile fabrics

	1Nylon	2Polyester	3Cotton	4Silk	5Wool
a) Strength					
a) Flammability					
a) Absorbency					
a) Colour					
a) Durability					
a) Appearance					
a) Texture					
a) Feel					
a) Warmth					
a) Natural (N) or Synthetic (S)					

Table 4.2

4.1.17 [LO 1.3]

Assignment 6 B

(a) Are you able to identify three qualities of textile fabrics made from natural fibres?
(b) Are you able to identify three qualities of textile fabrics made from synthetic fibres?

(a) Complete by writing down the correct answer:

Textile fabrics made from wool are warm and are more suitable for (summer / winter) clothes because they retain heat, while textiles made from cotton and linen are more suitable for (summer / winter).

When heat flows through some solid material from where the temperature is high to where the temperature is lower, we speak of **conduction**. When we use a material that is a poor conductor to keep heat in or out, such a material is called an **insulator**. A cool bag or tea cosy is made from fibres that are poor insulators. Fibres like wool, leather, fur and feathers keep warm air in and they therefore are good insulators. Natural fibres like wool are therefore preferred for (summer / winter) clothing.

Synthetic fabrics (let water through easily / do not let water through easily) and keep heat (in / out).

[LO 1.3]

Assignment 6 C (enrichment)

Design an experiment for determining the crease resistance / colour fastness / elasticity of different textile fabrics.

- Aim:
- Method and requirements.

		1Nylon	2Polyester	3Cotton	4Silk	5Wool
3	Observation					…….
4	Conclusion (S of N)					…….

Table 4.3

LO/AS 1.3	

Table 4.4

Assignment 7

Problem: You are part of a group of mountaineers who plan to climb the highest mountain in Africa, Mount Kilimandjaro. Find out what you could expect the climate to be like. Then plan your clothing for the expedition. Make a drawing of your outfit for the trip. Provide labels to explain what you will be wearing and indicate what material each item of clothing will be made of.

4.1.18 [LO 1.2]

Assignment 8

This represents a label from the collar of a school shirt: Answer the questions about the information on the label.

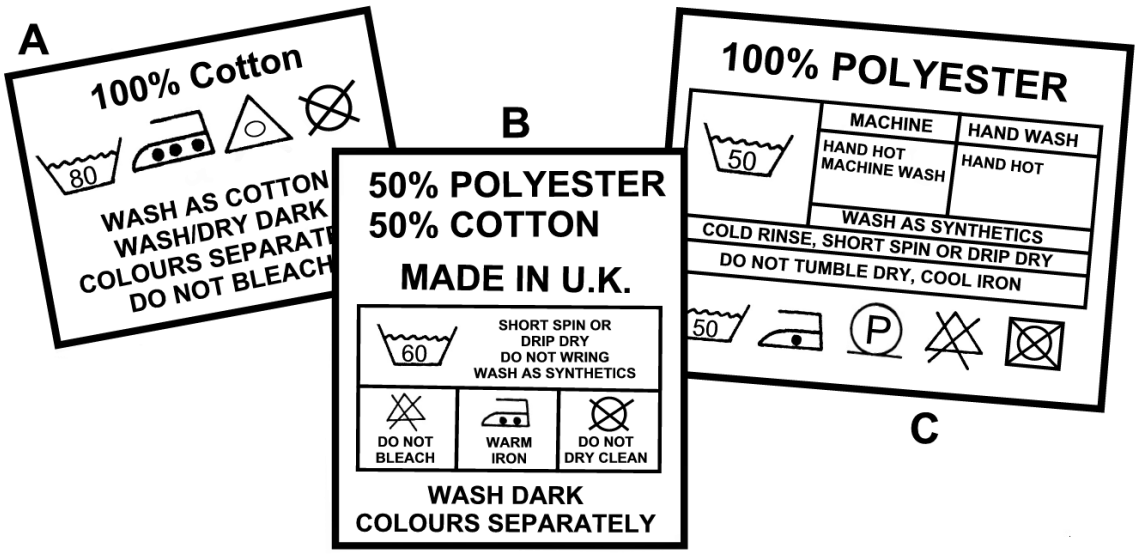

Figure 4.3

(a) Is the shirt made of a natural or synthetic fabric, or of a mixture?

Label A:
Label B:
Label C:

(a) What percentage of each textile fibre is used for the fabric?

Label A:
Label B:
Label C:

(a) Can you detect any care symbols that tell you how you should wash, dry or iron the fabric? Draw the symbols that you see:

	Label A	Label B	Label C
Washing			
Ironing			
Bleaching			

Table 4.5

(a) Consult the table and explain what the care symbols mean:

	Label A	Label B	Label C
Washing			
Ironing			
Bleaching			

Table 4.6

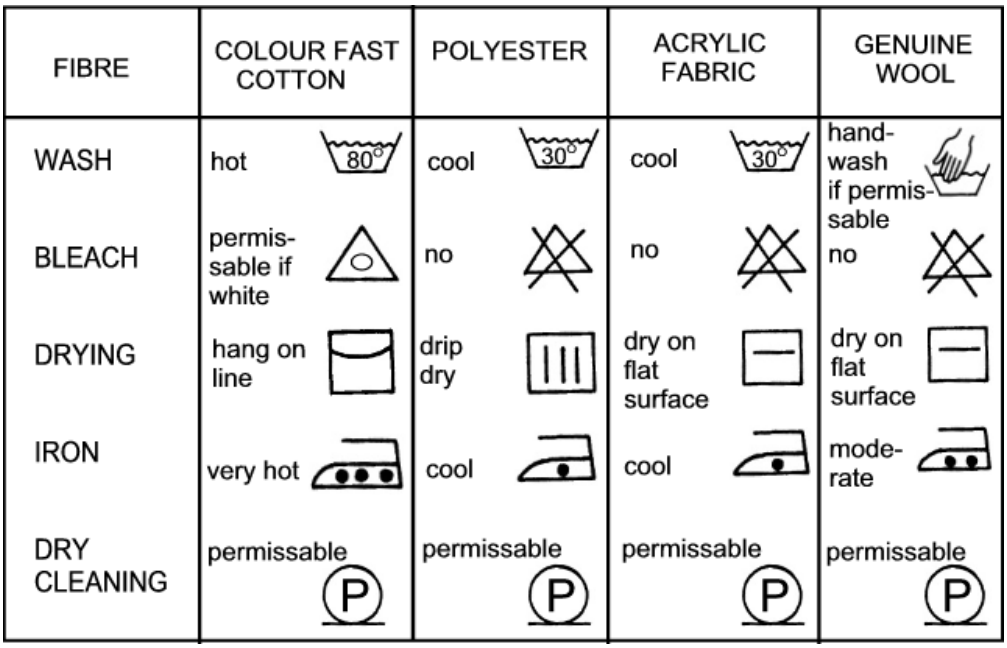

Figure 4.4

(a) Draw the wool mark that appears on labels of clothes made of 100% wool.

Source:

(a) **Complete** the statements by writing down the correct words:

- When you iron synthetic fabrics, the heat setting of the iron should usually be on (cool / very hot).
- Synthetic fabrics crease easily and may therefore go through / not go through the spinning cycle of the washing machine.
- Synthetic fabrics should preferably be washed in (lukewarm / very hot) water.

[LO 1.3]
Asssessment
LO 1

Technological Processes and Skills

The learner will be able to apply technological processes and skills ethically and responsibly using appropriate information and communication technologies.

We know this when the learner:

investigates:

1.2 finds out about existing products relevant to a problem, need or opportunity, and identifies some design aspects (e.g. who it is for, what it looks like, what it is for, what it is made of).

1.3 performs, where appropriate, scientific investigations about concepts relevant to a problem, need or opportunity using science process skills:

- planning investigations;
- conducting investigations;
- processing and interpreting data;
- evaluating and communicating findings.

designs:

1.4 writes or communicates, with assistance, a short and clear statement (design brief) related to a given problem, need or opportunity that demonstrates some understanding of the technological purposes of the solution;

1.5 suggests and records at least two alternative solutions to the problem, need or opportunity that link to the design brief and to given specifications and constraints (e.g. people, purpose, environment);

1.6 chooses one of these solutions, giving reasons for the choice, and develops the idea further.

makes:

1.8 uses suitable tools and materials to make products by measuring out, cutting or separating, shaping or forming, joining or combining, and finishing the chosen material.

evaluates:

1.10 evaluates, with assistance, the product according to the design brief and given spesifications and constraints (e.g. people, purpose, environment), and suggests improvements and modifications id necessary;

1.11 evaluates the plan of action followed and suggests improvements and modifications if necessary.

communicates:

1.12 produces labelled two-dimensional drawings enhanced with colour where appropriate.

LO 2

Technological Knowlede and Understanding

The learner will be able to understand and apply relevant technological knowledge ethically and responsibly.

We know this when the learner:

structures:

- demonstrates knowledge and understanding of how materials can be processed to change or improve properties (e.g. strength, fire resistance, waterproofing, taste, volume, texture).

LO 3

Technology, Society and the Environment

The learner will be able to demonstrate an understanding of the interrelationships between science, technology, society and the environment.

We know this when the learner:

Indigenous Technology and Culture:

3.1 recognises how products and technologies have been adapted from other times and cultures.

Impact of Technology:

3.2 suggests ways to improve technological products or processes to minimise negative effects on people and/or the health of the environment.

4.1.19 Memorandum

Assignment 1

Weapons: short spear assegai and knobkierie
shields of skin that protected the warrior from head to toe
Clothes: leather sandals or barefoot
a leather headband, leather bangles and beads/feathers around ankles and
a loin girdle, made from the tails of wild animals, strung together on a leather
briefs made out of skin
Source: translated from *Shak*a Jean Labuschagne (*Japsnoettake*, Daan Retief Publishers)
The warrior had to be very mobile; therefore he could not wear heavy clothes. Use own discretion.
Assignment 2
No, the leopards are a threatened species. / Yes, an old jacket. Own discretion
Assignment 3

Natural	Man-Made
a jacket made out of fur	a plastic bag
a wooden bowl	a glass bottle

Table 4.7

Assignment 4
Own discretion
Assignment 5
Own discretion – look out for variety of examples and completeness of labels.
Assignment 6A

	Nylon	Polyester	Cotton	Silk	Wool
a	Nylon	Polyester	Cotton	Silk	Wool
b	easily	easily	not easily	not easily	not easily
	shrinks away	hard coal	burns rapidly	smells like hair	smells like hair/feathers
	hardens	melts	smells like paper	melts	brittle ash/soft coal
	hard coal		brittle ash/soft coal		burns slowly
c	long	long	short	short	very short
d	depends on example				
e	less durable	less durable	durable	durable	durable
f	depends on example				
g	depends on example, usually ...			silky	resilient
	smooth	folds	rough	luxurious feel	woolly
	shiny		coarse	"noise"	low static electricity
	static		woolly	drapes beautifully	static
			little shine		
			slightly fluffy		
			low static electricity		
h	hard	hard	soft	in-between	soft
i	retains heat	retains heat	cool	cool	retains heat
j	synthetic	synthetic	natural	natural	natural

Table 4.8

Assignment 6B
(a) any three properties
(b) any three properties
(c) winter
summer
winter
difficult
inside
Assignment 6C

	Nylon	Polyester	Cotton	Silk	Wool
crease	resistant	does not crease as easily	warm iron	with care	preferably dry-cleaning

continued on next page

colourfast	do not bleach	more colour-fast	bleaches in sunlight	damaged by perspiration and bleaching	well
stretchable	little	little	may stretch a little	little	resilient
	synthetic	synthetic	natural	natural	natural

Table 4.9

Assignment 7
Own discretion
Cold climate – clothing that retains body heat.
Assignment 8
(a) Label A: natural
Label B: mixture
Label C: synthetic
(b) Label A: 100% cotton
Label B: 50% Polyester 50% Cotton
Label C: 100% Polyester
(d)

Label A	**Labe l B**	**Label C**
very warm wash	warm wash	warm wash
very warm iron	warm iron	warm iron
permissible if white	no bleaching	no bleaching

Table 4.10

(e)
(f) lukewarm
easy
lukewarm

4.2 Dying textile fabrics[2]

TECHNOLOGY
Grade 5
PROCESSING MATERIALS
Module 13
DYEING TEXTILE FABRICS
Background
Colour makes the clothes that we wear much more interesting. Which colours do you like wearing? Why?
Right across the world colour plays a significant role in the clothing worn for particular occasions. What colour plays an important role at funerals of white people?
What is the reason for this?
What is the traditional colour of the wedding dress of a bride among white people?
It is interesting to note that the mourners at Chinese funerals wear white clothes and that the guests at a wedding in Lapland wear red clothes.

[2]This content is available online at <http://cnx.org/content/m26151/1.1/>.

Assignment 1

Research

Are there specific colours that play an important role in the cultural group to which you belong? Explain this (in three sentences).

[LO 3.1]

Textile fabrics are coloured with dye. In the past, natural dyes obtained from plants and animals were used. Purple dye, for instance, was obtained from a small sea snail. Natural dyes produce soft colours, but it is difficult to obtain the exact shade of a colour time after time. Nowadays, dyes are made from chemical substances that provide bright, predictable colours that are also colour fast.

Assignment 2

Design and Manufacturing

We will be using dyes for colouring fabric. Put on an apron to protect your clothes and wear rubber gloves. You can obtain a natural dye from turmeric, spinach leaves, rooibos tea, beetroot leaves and many other edible plants that you may get hold of easily in your environment, by boiling it in water for approximately ten minutes. Allow the mixture to cool and remove all plant material from the liquid. Strain the remaining liquid. This provides a natural dye that is dissolved in water.

[LO 1.3]

REMEMBER:

For this project you must remember that boiling water is dangerous, because you may get burnt. Keep a first aid kit at hand and do the assignment under the educator's supervision.

Assignment 3

This is a tie-and-dye project. You will make a fashionable T-shirt or headscarf, but you should not attempt this exercise without adult supervision.

Requirements: Dye; white cotton fabric (a hemmed 50cm square cloth) or a white cotton T-shirt; string for tying the cloth or shirt; rubber gloves; 2 basins for water; a large pot and a plastic bowl; a wooden spoon or a long stick; a heat source (electric or gas stove).

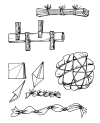

Figure 4.5

---

a) You may have to consult a book on tie-and-dye craft if you have not done this before. Fold and tie the cloth according to the pattern you want to create. Experiment or use ideas from the book you have consulted. You will find that areas that are tied securely will remain white when you dye the fabric, so be sure to wrap the string tightly and to tie it securely.

Figure 4.6

b) Remember that you need to protect your clothes (apron) and hands (gloves). Also remember the safety precautions when you work with boiling water.

Figure 4.7

c) Bring the dye solution (the natural dye that you have made) to a boil. Wet the fabric in a bowl of clean, cold water and wring out all excess water.

Figure 4.8

d) Place the damp fabric into the boiling dye solution and stir it, using the stick or long-handled wooden spoon, until it comes to a boil again.

Figure 4.9

---

e) Remove the pot from the stove.

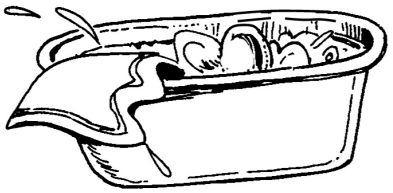

Figure 4.10

f) Leave the fabric in the dye solution until the liquid is cool.

Figure 4.11

g) Rinse the cloth in a bowl of water with a little detergent

Figure 4.12

h) Now rinse it thoroughly in cold water.

Figure 4.13

Remove the string.

Figure 4.14

j) Iron while the cloth is still damp.

REMEMBER! An iron can also burn you. [LO 1.8]

Assignment 4

Assessment

Assignment for the Educator

Use the questionnaire in Learning Unit 4 en replace the word "mat/carpet" with head-cloth, T-shirt or product.

Assignment for the Learner

Complete the questionnaire on your product as honestly as possible.

[LO 1.10; 1.11]

Asssessment

LO 1

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planning investigations;

conducting investigations;

processing and interpreting data;

evaluating and communicating findings.

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Impact of Technology:

3.2 suggests ways to improve technological products or processes to minimise negative effects on people and/or the health of the environment.

4.3 To print on cloth[3]

TECHNOLOGY

Grade 5

PROCESSING MATERIALS

Module 14

TO PRINT ON CLOTH

Background information

Another method for obtaining coloured textile fabrics is to dye the yarn with which the fabric will be woven before weaving it. The patterns that are desired are then created while the fabric is woven. Patterns can also be printed onto fabric after it has been woven.

In India patterns have traditionally been applied with pattern blocks used to stamp the colour onto the cloth. The dye (paint) is spread over the block and the stamp is then pressed onto the fabric.

Nowadays screen-printing that is done with machines is also used to apply patterns to textile fabrics.

[3]This content is available online at <http://cnx.org/content/m26164/1.1/>.

Figure 4.15

Figure 4.16

Assignment 1

You can apply a design of your own to cloth by printing it. You will need the following:

a 20cm x 20 cm piece of cloth; fabric paint; paintbrushes; a jug of water; pencil and paper. For the printing block you will need: a thin, compact sponge (from the cleaning equipment department at a supermarket); carbon paper for tracing; a pair of scissors; a flat piece of wood (8cm x 8cm) and wood glue;

or

a 20cm x 20 cm piece of cloth; fabric paint; paintbrushes; a jug of water; pencil and paper; a large potato and a sharp knife, if you cannot obtain the above; a wooden board; fibre-tipped pens (kokis); rubber gloves; an apron for protecting your clothes and old newspapers.

Research

Assignment 2

Collect examples of simple designs that could be transferred to stamps for printing on fabric. Make drawings of at least three examples

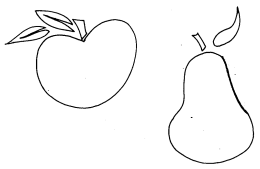

Figure 4.17

Source:
[LO 1.2]
Design
Assignment 3
Design simple stamps that could be used for printing on fabric.
[LO 1.5]
Assignment 4
My final choice.

Circle your best effort and develop and redraw it to the correct size inside the square (5 cm by 5 cm). Make notes to explain what you regard as good and weak about at least three of your designs. Use colour and supply labels.

Motivate (explain) why this is your final choice.
[LO 1.6]
Producing
Assignment 5

You are ready to make your printing block (stamp) now. Trace your pattern onto the sponge, using carbon paper and a pencil. Cut out the design, using a pair of scissors. Paste the cut design on the wooden block, with the wood glue, and leave it to dry.

OR

Cut the potato in half on the wooden board, but try to make a very smooth cut.

REMEMBER the following to avoid cutting yourself: Hold the knife in such a way that the blade is directed away from you. Cut away from your hand. Be sure to work under adult supervision.

Draw your design onto the cut surface of the potato, using the felt-tipped pen. Cut away the superfluous surface around your design (to a depth of 1cm). The surface that remains is the printing surface and will be what you see when you print the design onto the fabric. The potato is your printing stamp.

You are ready to start printing. Lay out a couple of layers of newspaper to have a smooth surface for printing. Dampen the cotton fabric and lay it out on the newspaper. Keep it in position by means of masking tape. Paint an even layer of fabric paint onto the printing surface of the printing stamp. Place the printing surface on the fabric and press it down firmly. Lift it carefully, apply more fabric paint and continue printing.

If you want to use two colours, it is advisable to make two printing blocks, as it may be difficult to clean one block well enough to prevent paint from smudging. If you do not want to take this amount of trouble, but want to print in two colours, you should use a lighter and a darker colour and print the lighter colour first.

You could also experiment with overprinting in two colours by printing one colour and waiting for it to dry completely before reprinting with another colour and another design.

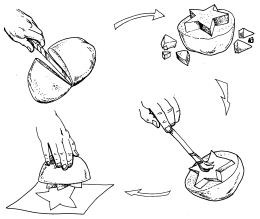

Figure 4.18

Use pinking shears to cut the rough edges of the fabric or fray them. Use the cloth as a decorative cover for a jar of preserved fruit or vegetables. Tie it down with a matching ribbon or tape.

Figure 4.19

[LO 1.8]
Evaluation
Asssessment
LO 1
Technological Processes and Skills
The learner will be able to apply technological processes and skills ethically and responsibly using appropriate information and communication technologies.
We know this when the learner:
investigates:
1.2 finds out about existing products relevant to a problem, need or opportunity, and identifies some design aspects (e.g. who it is for, what it looks like, what it is for, what it is made of).
1.3 performs, where appropriate, scientific investigations about concepts relevant to a problem, need or opportunity using science process skills:
planning investigations;
conducting investigations;
processing and interpreting data;
evaluating and communicating findings.
designs:
1.4 writes or communicates, with assistance, a short and clear statement (design brief) related to a given problem, need or opportunity that demonstrates some understanding of the technological purposes of the solution;
1.5 suggests and records at least two alternative solutions to the problem, need or opportunity that link to the design brief and to given specifications and constraints (e.g. people, purpose, environment);

1.6 chooses one of these solutions, giving reasons for the choice, and develops the idea further.

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1.8 uses suitable tools and materials to make products by measuring out, cutting or separating, shaping or forming, joining or combining, and finishing the chosen material.

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1.11 evaluates the plan of action followed and suggests improvements and modifications if necessary.

communicates:

1.12 produces labelled two-dimensional drawings enhanced with colour where appropriate.

4.4 Weaving cloth[4]

TECHNOLOGY

Grade 5

PROCESSING MATERIALS

Module 15

WEAVING CLOTH

HOW DO WE WEAVE CLOTH?

This is done on a weaving frame. A set of threads (the warp) is stretched lengthwise on the frame and alternate threads are raised or depressed while a crossways thread (the weft) is passed between the raised or depressed threads and those that are kept in position.

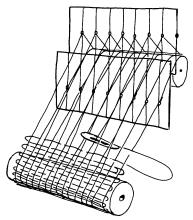

Figure 4.20

Early inhabitants of our country wove mats of which they used as sleeping mats or as matting to cover their dwellings.

Assignment 1

Research

To the Educator:

Invite someone who is skilled in weaving reed mats to demonstrate the process to the learners. Ask each learner to make a donation towards remunerating your guest for the trouble he / she has taken.

[LO 3.1]

Assignment 2

Context

Imagine that you are part of a needy family. As both of your parents work hard to keep you at school, you feel that you would like to help them by making something for them.

[4] This content is available online at <http://cnx.org/content/m26169/1.1/>.

Problem

Your mother complains about the mud that is brought into the house by your father and the children in the family because there is no doormat. You decide to weave a mat.

Limitations

You have a limited length of thread to use for the warp (lengthways threads), a grape box to use as a weaving frame and no yarn to use as weft (the treads that are passed from side to side through the warp threads). Plastic bags, however, are plentiful and easily obtainable.

[LO 1.4]

Assignment 3

Design

Figure 4.21

Figure 4.22

Plastic bags as option:

Collect as many plastic shopping bags as possible and sort them according to size. Prepare them for use by cutting off the handles and then cutting them in the round into 3cm-wide strips. Roll up the strips in the shape of a round ball.

What other material could be used as weft? List all the possibilities (remember that you do not have any money to buy expensive material).

[LO 1.5]

Choose any of the above-mentioned possibilities and explain your choice.

[LO 1.6]

Manufacturing

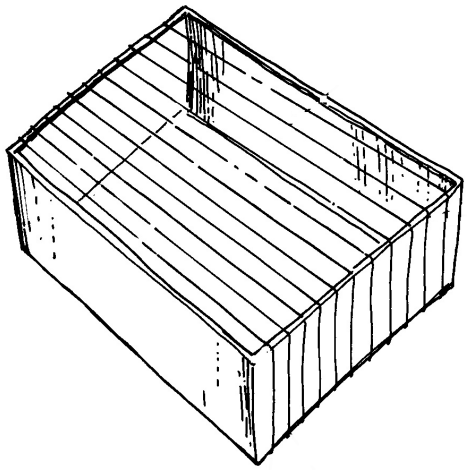

Figure 4.23

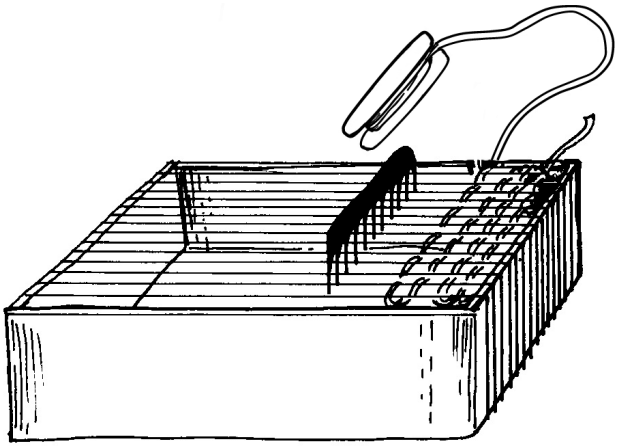

Figure 4.24

Prepare the grape box by cutting notches 1 cm apart along the broad sides of the box. Stretch the warp threads by winding the thread around the grape box, fitting it into the notches. Secure the beginning and the end of the thread firmly.

Plastic bags as option

Cut a "shuttle" from a firm piece of cardboard and wind the plastic strip from one shopping bag around it. This will make passing the weft through the warp much easier.

Begin weaving by passing the shuttle through the warp threads from the one side of the box to the other, but be sure to attach the loose end of the weft to the warp at the corner where you start and weave it

in. When you weave, the shuttle must pass over and under consecutive warp threads until you reach the opposite side of the warp. When you weave the second row you must alternate the threads; where you have passed over a warp thread in the previous row, you must pass under it in the present row.

Be careful to avoid pulling hard on the plastic strip – it might break, or your weaving will not be straight-edged.

Continue weaving the shuttle through the warp threads until you come to the end of the strip of plastic, then wind the next strip of plastic around the shuttle and continue weaving from where you stopped.

Push the weft rows firmly against each other after every row – use a coarse comb for this – to make the weaving strong and firm.

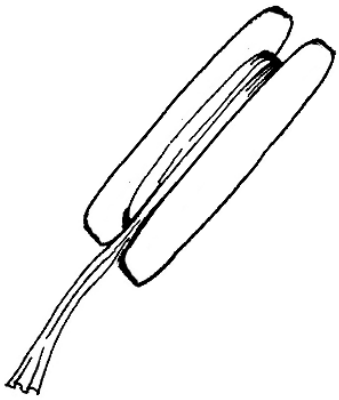

Figure 4.25

Figure 4.26

When you have covered all the visible warp threads on the top of the box, you may cut through the threads at the bottom of the box (so that the loose ends are equal in length) and knot these loose ends together in pairs right against the cardboard frame to finish off the woven mat. Cut the ends shorter to form a fringe and remove the mat from the frame.

If you have many similar bags, you may make a plain mat, but if you have a variety of colours, you may weave stripes of colour or experiment with weaving blocks of colour to form a repeat pattern.

Non-flexible materials as option

Should you like to use reeds or rubber strips as weft, cut it to the desired width and thread it through alternatively. Repeat until the entire width has been weaved.

As a matter of interest

Consult sources on methods of weaving and try to weave patterns into your doormat.

[LO 1.8]

Assignment 4

Make a three-dimensional drawing of the mat you have woven, in colour and with labels. Also indicate the exact size (length and width).

[LO 1.12]

Background and information

It is very difficult to get rid of plastic bags that have been allowed to pollute nature. They do not decay naturally and are not absorbed into the soil because they are manmade. This means that they do not form biodegradable waste, just like glass and metal, which also do not decompose readily. If you therefore recycle plastic bags (by using old products to make new products) you will be helping to reduce the amount of waste that litters the earth and you will be making a positive contribution to ensure the continued existence of the earth.

Figure 4.27

Assignment 5

Write down five examples of old plastic, metal or glass products used to make new products.

[LO 3.2]

Assignment 6

Evaluation

Does your doormat meet expectations? Motivate this with reasons.

Indicate two aspects of the assignment that you found difficult.

Indicate two aspects of the assignment that you found easy to do.

What were the problems that occurred and what did you do to solve them?

[LO 1.11]

Ask at least five adults to give their honest opinion of your mat and to say what they would be willing to pay for such a mat.

NAME	OPINION	PRICE

Table 4.11

Provide at least three recommendations that you would follow to improve your design and product if you had to repeat the assignment.

Calculate the approximate cost of making the mat.

How much did you have to spend to weave the mat?

[LO 1.10]

CHALLENGE: How about weaving mats like these in your spare time and selling them?

Asssessment

LO 1

Technological Processes and Skills

The learner will be able to apply technological processes and skills ethically and responsibly using appropriate information and communication technologies.

We know this when the learner:

investigates:

1.2 finds out about existing products relevant to a problem, need or opportunity, and identifies some design aspects (e.g. who it is for, what it looks like, what it is for, what it is made of).

1.3 performs, where appropriate, scientific investigations about concepts relevant to a problem, need or opportunity using science process skills:

planning investigations;

conducting investigations;

processing and interpreting data;

evaluating and communicating findings.

designs:

1.4 writes or communicates, with assistance, a short and clear statement (design brief) related to a given problem, need or opportunity that demonstrates some understanding of the technological purposes of the solution;

1.5 suggests and records at least two alternative solutions to the problem, need or opportunity that link to the design brief and to given specifications and constraints (e.g. people, purpose, environment);

1.6 chooses one of these solutions, giving reasons for the choice, and develops the idea further.

makes:

1.8 uses suitable tools and materials to make products by measuring out, cutting or separating, shaping or forming, joining or combining, and finishing the chosen material.

evaluates:

1.10 evaluates, with assistance, the product according to the design brief and given spesifications and constraints (e.g. people, purpose, environment), and suggests improvements and modifications id necessary;

1.11 evaluates the plan of action followed and suggests improvements and modifications if necessary.

communicates:

1.12 produces labelled two-dimensional drawings enhanced with colour where appropriate.

LO 2

Technological Knowlede and Understanding

The learner will be able to understand and apply relevant technological knowledge ethically and responsibly.

We know this when the learner:

structures:

demonstrates knowledge and understanding of how materials can be processed to change or improve properties (e.g. strength, fire resistance, waterproofing, taste, volume, texture).

LO 3

Technology, Society and the Environment

The learner will be able to demonstrate an understanding of the interrelationships between science, technology, society and the environment.

We know this when the learner:

Indigenous Technology and Culture:

3.1 recognises how products and technologies have been adapted from other times and cultures.

Impact of Technology:

3.2 suggests ways to improve technological products or processes to minimise negative effects on people and/or the health of the environment.

Memorandum

Assignment 3

(a) originality own discretion

(b) originality/ creativity, own discretion

Assignment 4

Completeness, use of colour, proportion, labels, own discretion

Assignment 5

Perceptiveness, originality, creativity, own discretion

Assignment 6

Careful observation, honesty, thoroughness, own discretion

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